STEEL
The Metalworking Weekly
A PENTON PUBLICATION
DECEMBER 11, 1961

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REJUVENATING RED-HEADS

How to make an old Boringhead or Wheelhead Good as New

by Arthur Walsh
Manager, Parts Sales
The Heald Machine Company

There's only *one* way to make an old Red-Head good as new. Return it to its maker!

This statement is neither facetious nor exaggerated. Let's look at the facts.

A precision machine tool spindle, although basically simple in design, is one of the most carefully engineered and meticulously manufactured components of the entire machine. This is particularly true of Heald Red-Head Boringheads and Wheelheads. It has to be that way, for on the *spindle* depends the performance of the machine and the reputation of the Company.

When a Red-Head Wheelhead or Boringhead needs reconditioning, and you want it restored to original Red-Head precision, ship it back to us here in Worcester. For nobody knows as much about a product as the company which made it. And certainly no one else has so much at stake on its performance!

When a head comes back here we give it the full Red-Head treatment. This includes as *much* or as *little* as needs to be done to make it as good as new. Any or all of the following items may be replaced or reworked, depending on their condition – body, spindle, caps, slingers, pulleys, spacers, spring cages, bearings and miscellaneous parts. Only the finest Ultra-precision bearings made to Heald specifications are used – precision matched for exactly the right internal clearances, fits and preloads.

After final inspection and reassembly, every rebuilt Red-Head is run continuously on the test jack for eight hours to check for temperature rise, noise level and vibration. A head that passes all of our inspections and tests is in every respect as good as new.

The cost depends on the amount of work done and the parts reworked or replaced. But in all cases you get a head that carries the original Heald guarantee, at far less than the cost of a new head.

Several of our customers have adopted a policy of regularly-scheduled head rebuilding on a preventive-maintenance basis. This has worked out very well, as it keeps the amount of repairs to the minimum, assures fast return of the rebuilt heads and substantially reduces rebuilding costs.

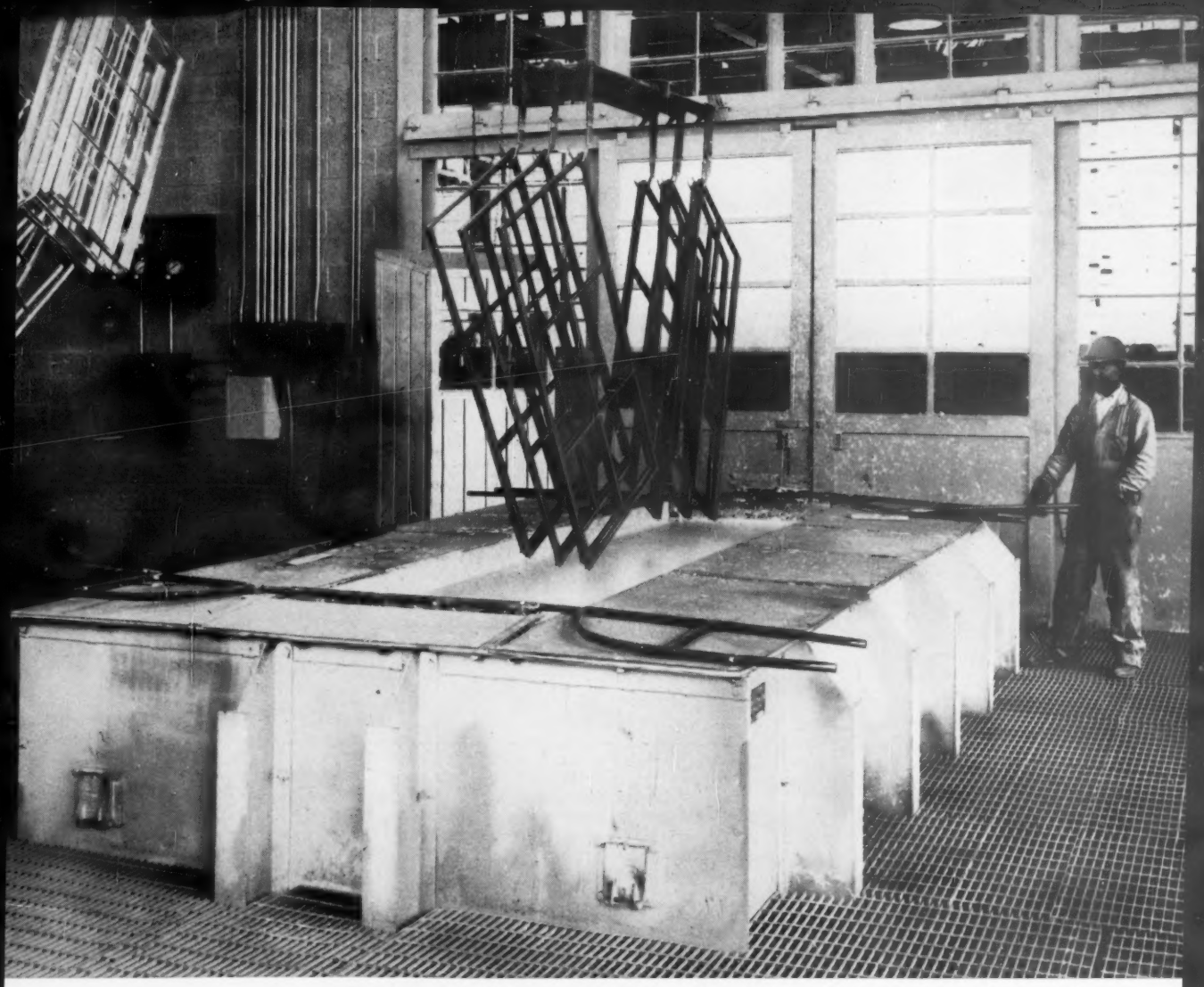
It pays to come to Heald for all your Red-Head repairs.

Anti-Friction bearings for Heald Red-Heads are carefully selected and thoroughly inspected before assembly into any Red-Head – the same rigid specifications must be met for bearings to be used in either **new** or **rebuilt** heads.

It Pays to come to Heald

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts



Rugged strength is built into these steel windows by the skillful design of the special rolled steel bar section. Here, in a steel fabricator's shop, they get a "beauty bath" of gleaming zinc to give them long life and eye appeal.

It's hard to beat the strength and long life of HOT-DIP GALVANIZED STEEL

Steel . . . well-galvanized . . . is an economical way to retain strength and solve the problem of corrosion. In the majority of cases, there's no need to substitute expensive, less desirable materials when the cost of galvanizing steel is so low.

If strength is the heart of your product, you'll naturally begin with steel. To preserve the steel's strength for a lifetime of service, seal out corrosion by specifying a rich zinc coating by hot-dip galvanizing. Hot-dip galvanizing gives you a thick, uniform, non-porous coating.

You can't beat steel for strength, versatility, low-cost. Hot-dipped in zinc by a galvanizer who knows how to do it, your product will offer the ultimate in long service life.

Whether you need steel or technical assistance, you'll get all the help you need by calling the nearest Bethlehem sales office. Or, if you prefer, write to the address below. Either way, your inquiry will be handled promptly.

Galvanized Steel

for Strength
. . . Economy
. . . Versatility

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Important differences in fire-resistant fluids

Unlike petroleum oils, fire-resistant fluids have markedly different chemical properties which should be carefully considered before making a final selection.

To simplify this selection, we show here some of the variables—and limitations—of the three major fire-resistant types. Houghton is uniquely qualified for this unbiased analysis since we favor no one type over another. We make them all—and a full range of hydraulic packings as well.

1. Water-Glycol Fluids

These fluids contain water, glycol and a thickener. They provide the highest degree of fire protection. They are also compatible with the widest range of packing materials including those commonly used with petroleum oils. They should only be used, however, in systems operating at reservoir temperatures below 150°F.

Houghton's Houghto-Safe 200 and 600 Series are of this type and enjoy top acceptance and use by the armed services, as well as general industry. This wide-spread usage is due to important additives that provide *extra* anti-wear, rust inhibiting, anti-foam and metal deactivator properties to improve performance and increase pump life.

2. Phosphate-Ester Fluids

Fluids of this type are composed of straight phosphate esters and may contain small amounts of additives. These fluids can be used over the widest range of hydraulic pressures; they provide maximum lubricity for heavy bearing loads, and will stand up where ambient temperatures exceed 150°F. Packings used with these fluids must be Butyl, Butyl-Fabric or Polysulphide-impregnated Leather.

Houghton's Houghto-Safe 1000 Series are phosphate-ester fluids specially selected and compounded with additives to improve wear and rust resistance and add other proven operating benefits. Here again, Houghto-Safe 1000 Series has earned acceptance and is used on many military and space projects, as well as many of industry's toughest applications.

3. Emulsion Fluids

These fluids are either emulsions of water-in-oil (non-ionic) or oil-in-water (anionic). The following statements pertain to the water-in-oil type which are most widely used in industrial hydraulic systems.

Since these fluids are made of water and petroleum, they are compatible with standard Buna N rubber packings. They are also the lowest cost of all fire-resistant fluids. Their fire resistance is also the lowest of all three types; they should be used only in areas requiring a moderately safe fluid. The operating pressures of these fluids is generally limited to under 1000 psi.

Houghto-Safe 5000 Series designates Houghton's emulsion type fluid. It is a water-in-oil (non-ionic) fluid not affected by water hardness. Special additives are used to provide stability of the emulsion and to increase lubricity.

COMPARISON OF HYDRAULIC FLUIDS

Fluid Type	Viscosity Temperature Characteristics	Fire Resistance	Lubricity	Max. Fluid Temp. °F.	Relative Cost
Emulsion Fluids	Fair	Fair	Fair	See Note	1
Water-Glycol Fluids	Very Good	Excellent	Good	See Note	2
Phosphate-Ester Fluids	Poor	Good	Very Good	See Note	3

NOTE:—The Joint Industry Conference (JIC) Hydraulic Standards recommends the following where systems are operated continuously.

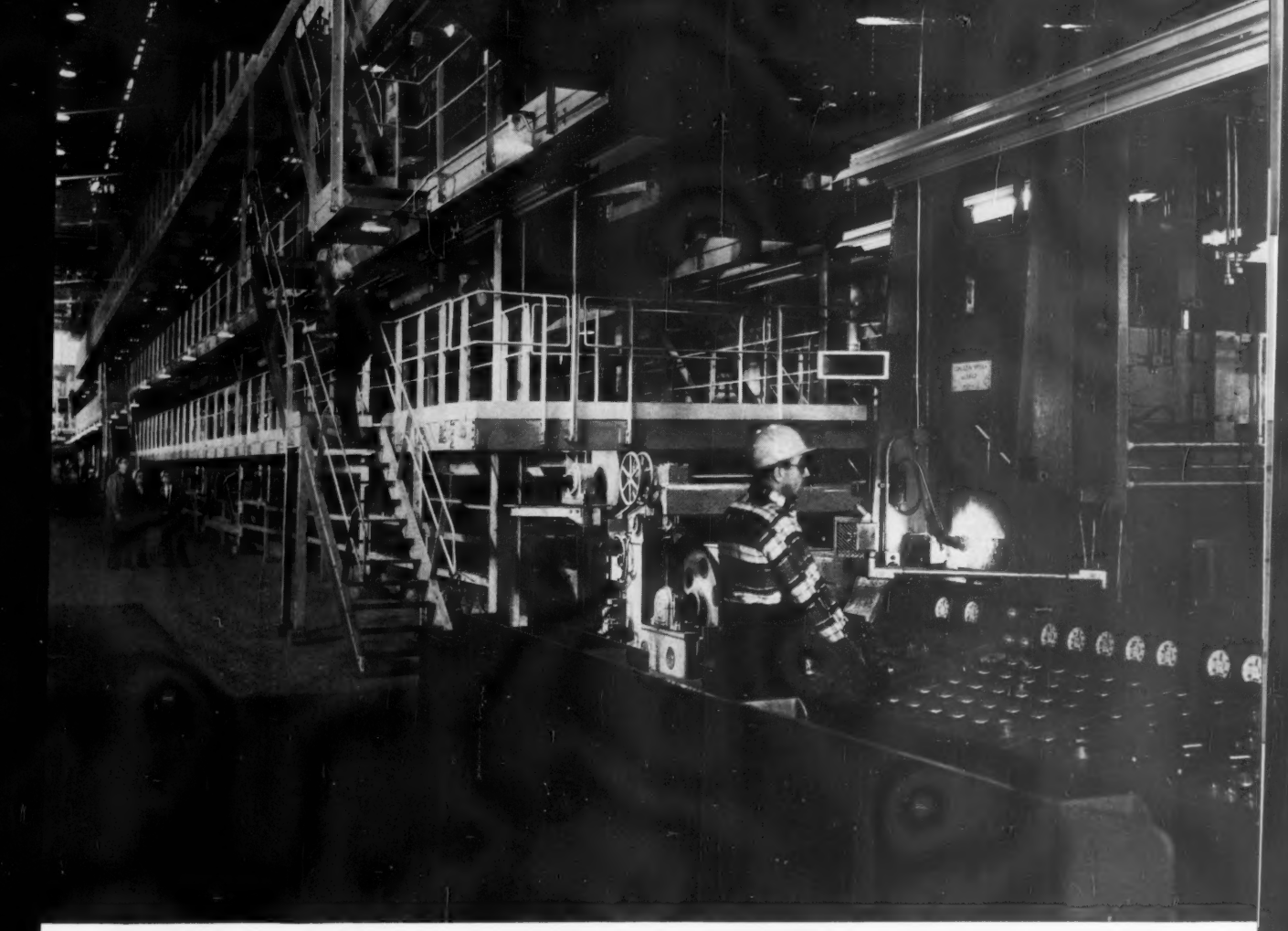
1. **For water base fire-resistant fluids, the temperature of the fluid should be controlled so as not to exceed 120°F. at the pump inlet.**
2. **For other fluids, including petroleum oil, the temperature of the fluid should be controlled so as not to exceed 130°F. at the pump inlet.**

For unusual system conditions where it is impossible to adhere to these reservoir temperature levels, the Houghton representative should be consulted.

For detailed information booklet describing all types of fire-resistant fluids, or help in selection, call your Houghton representative or write: E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia 33, Pa.

Houghton

INDUSTRY'S PARTNER IN PRODUCTION



Widest Galvanizing Line in the world built by Wean for Armco Steel Corporation

Designed to turn out zinc-coated steel coils and sheets up to 72″ in width, this new Wean galvanizing line was recently installed at Armco Steel Corporation's Middletown, Ohio, plant.

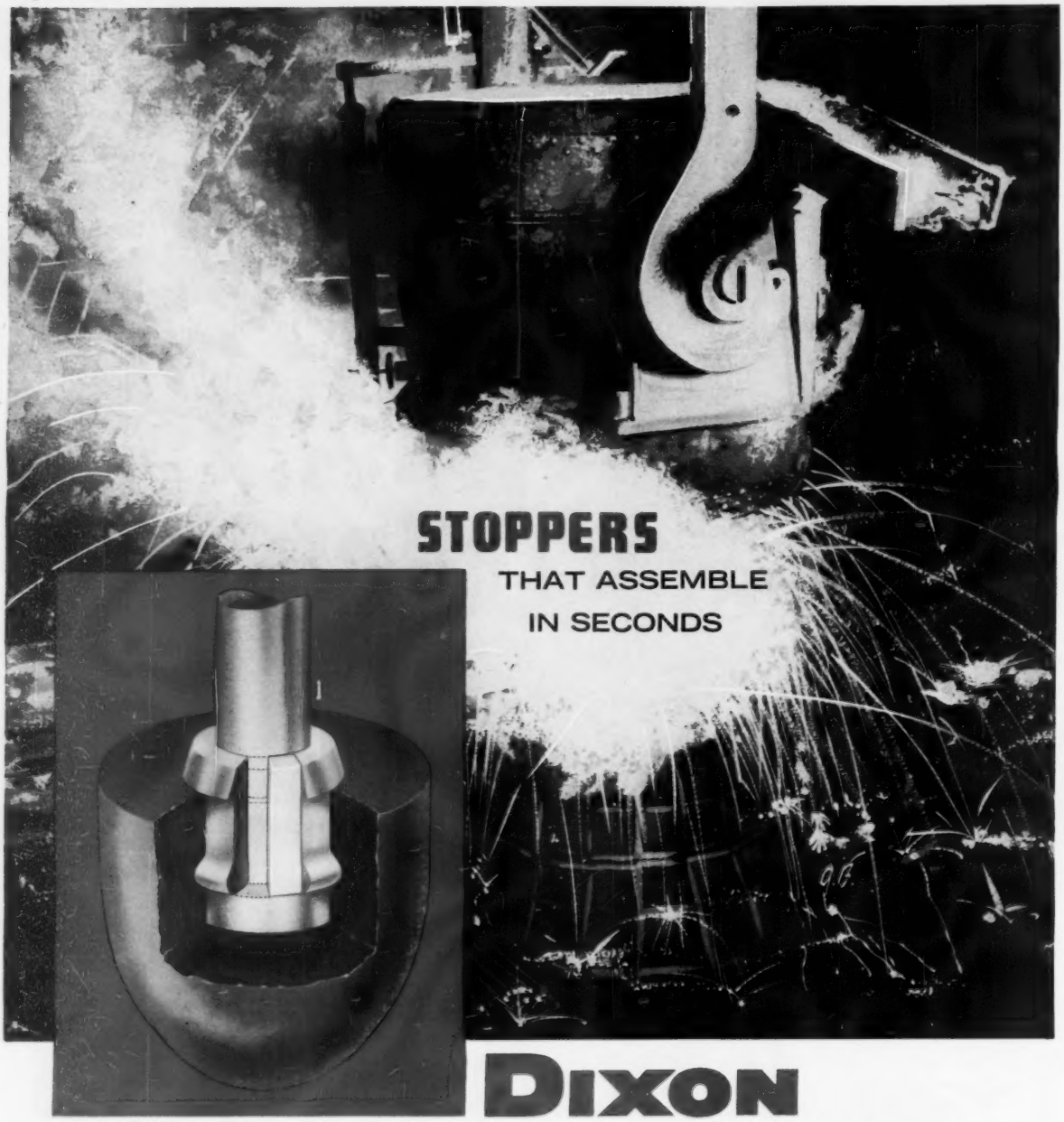
The tremendous increase in production offered by this mammoth installation will enable Armco to take advantage of the rapidly growing demand for zinc-coated steel sheets, and its extreme width will open new possibilities in design and fabrication for Armco's customers.

Employing the Armco-Sendzimir process of annealing and coating in one continuous operation, this line is capable of handling coil weights up to 50,000 pounds and strip gauges from 11 through 22. The line operates at speeds up to 300 fpm.

Wean Engineering has played a prominent role in major developments in all types of continuous galvanizing. Why not take advantage of this experience right from the planning stages in your next expansion of galvanizing facilities?

WEAN

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO



DIXON

The new DIXON Keylock Stopper provides quick, positive, one-man assembly plus greater strength than any other solid nose stopper on the market. Completely self-locking, it requires no adhesive cement to hold it together—employs no pins, bolts, keys or threads.

Hundreds of rugged tests in various types of operating plants have proven its advantages: improved pouring, cleaner shut-offs, greater overall economy.

In addition, this new DIXON Keylock design minimizes the problem of stopper damage. Sleeve thrust and weight are supported by the rod flange, not exerted on the stopper itself. And, since it is not necessary to slide inserts down the full rod length, another damage possibility—broken or chipped inserts—is eliminated.

DIXON has also engineered a new T-Rod Stopper... the fastest, easiest on the market to assemble. Featuring design simplicity and other advantages comparable to the Keylock, this new T-Rod can actually be assembled in seconds, and offers efficiency and economy factors superior to other Stoppers presently available.

Write today for full descriptions and details. Representatives in all principal cities.

CRUCIBLE & REFRACTORIES DIVISION

THE JOSEPH DIXON CRUCIBLE COMPANY

JERSEY CITY 3, NEW JERSEY

STEEL Veteran

Erle Ross is at home with the technical, news, and economic phases of production, distribution, and fabrication. But he concentrates on the market and price reports which begin this week on Page 129.

A 1917 graduate of Purdue University, Erle became associated with Penton Publishing Co. in 1919. He has served as editorial representative, associate editor, and engineering editor of STEEL. He was named Chicago editor in 1940.

Walsh-Healey

The U. S. Chamber of Commerce periodically issues a bulletin on Walsh-Healey & Davis-Bacon, two pieces of legislation affecting defense and other government contractors.

The chamber's Nov. 3 bulletin includes a reprint of Washington Editor Jack Botzum's analysis of the situation, which appeared in STEEL, Oct. 9, p. 79. "It's an excellent article," says the chamber, "and is enclosed for your careful reading."

Incidental Intelligence

Item: More than 2.3 million secretaries labor in the U. S.

Item: One missile uses 17 arming switches. If it were possible to get 100 per cent reliability, one would serve the purpose. But we can't get perfection, so 16 can fail without jeopardizing performance of the weapon.

Puzzle Corner

The Nov. 27 cut up cube yielded eight cubes with three sides black, 12 with two sides black, 6 with one side black, and 1 with no sides black. First in with that correct answer were W. J. Slattery Jr. of Hanson-Van Winkle-Munning Co., K. S. Batchelor of Allegheny Ludlum Steel Corp., Paul A. Umbstead of Mosler Safe Co., E. R. Diewald of Ridge Tool Co., and H. Paul Henderson of Clover Industries Inc.

A chipmunk is sitting on a log 10 ft long and 3 ft in circumference. As the log rolls down hill, a distance of 50 ft, the chipmunk goes from one end of the log to the other, always remaining on top. How far does the chipmunk travel?

Winners

The National Machine Tool Builders' Association has picked these first place winners in its annual Business Magazines Advertising Competition:

Danly Machine Specialties Inc., Chicago; Greenlee Bros. & Co., Rockford, Ill.; Gleason Works, Rochester, N. Y.; Warner & Swasey Co., Cleveland; Armstrong-Blum Mfg. Co., Chicago; G. A. Gray Co., Cincinnati; American Tool Works Co., Cincinnati; National Acme Co., Cleveland; Gisholt Machine Co., Madison, Wis. (two awards); Landis Tool Co., Waynesboro, Pa.; Gardner Machine Co., Beloit, Wis.

Metalworking Duet

When their business cares become too pressing, two executives of Assembly Products Inc., Chesterland, Ohio, may relax musically. John D. Saint-Amour, president, left, is a French horn player. George F. Quittner, chief research engineer, is a jazz pianist. Although they posed together for us, their styles and instruments are not suited for duets. They save their "togetherness" for Assembly Products (see Page 50).

Mr. Saint-Amour joined the company in 1948 on a summer job that was to tide him over until he could begin regular employment with the Columbus (Ohio) Symphony Orchestra that fall. He had always been a radio and electronics enthusiast and liked the temporary job so well that he stayed on. He still plays the horn regularly in the Suburban Symphony Orchestra, Cleveland.

Mr. Quittner plays Dixie Land jazz professionally two nights a week at Cleveland restaurants.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

the combination makes all the difference!

Milford specializes in both rivets and rivet setting machines. This benefits you in three ways:

1. Milford engineers help you determine not just a fastener, but the correct rivet for your assembly requirements. It may be semi-tubular, full tubular, split or compression; it may be a particular steel, brass, aluminum or alloy; it may be plain, plated, japanned or anodized.

2. The rivet setting machine and tooling recommended by Milford will be ideally matched to the parts to be assembled and specifically geared to the volume you run.

3. Get the combination that gives you lowest "in-place cost" — Milford rivets and Milford machines — for uninterrupted, quality production.

We'll be glad to quote on your needs immediately.

MILFORD RIVET

THE MILFORD RIVET & MACHINE CO.

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...Fluid Power news

OILGEAR powers line pipe carriages and expanders

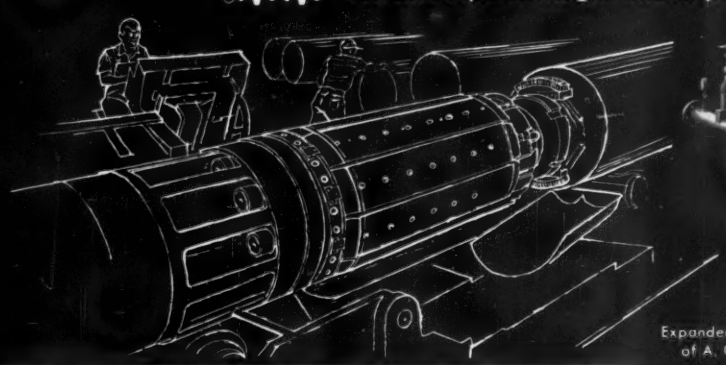
Report No. 11,808 From Oilgear *Application-Engineering* Files

How OILGEAR electric, remote-controlled, heavy-duty Pump Systems keep line pipe carriages and expanders at peak production — for over 10 years

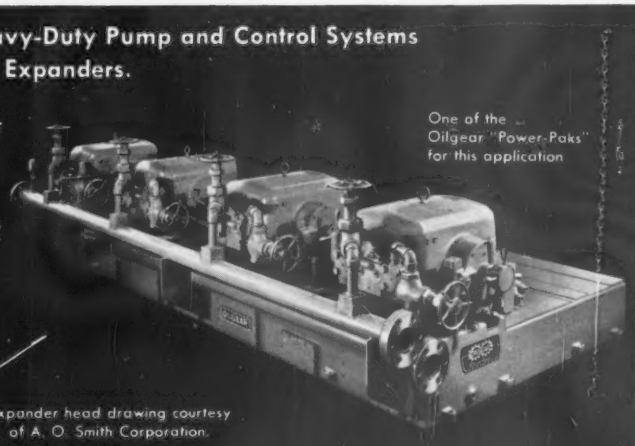
A. O. Smith Corporation, Milwaukee, Wisconsin, and Houston, Texas — User

PROBLEM: Expand 40-ft lengths of electrically-welded, high-pressure line pipe ranging from 10¾" to 36" diameters, with wall thicknesses from 7/32" to ½", and weighing from 1000 to 7000 pounds — to extremely accurate inside circumference and uniform diameter without retaining dies. This new, exclusive process developed by A. O. Smith, that literally moves all variations in pipe thickness to the outside — required remote-controlled *Fluid Power* for operating two high-speed carriages, and two high-tonnage expanders. One carriage to automatically feed one-half length of line pipe in about 3-ft steps over one expander . . . the other half-length to be processed on the adjacent, opposing carriage and expander. Both carriages and expanders to operate at the same time. **FLUID POWER AND CONTROL REQUIREMENTS:** 1. Over 400 gpm of controlled *Fluid Power* at pressures to 3000 psi for operating each internal expander . . . and over 100 gpm of controlled *Fluid Power* at pressures to 1350 psi for operating each pipe-feeding carriage. 2. Provide quick, cushioned, adjustable function response to remote pushbutton or semi-automatic control. 3. Remote mounting of pumps, electric motors, and reservoirs on floor below pipe machines to provide more space for pipe production. 4. Keep hydraulic piping to a minimum. 5. Systems must be leak-tight, trouble-free, dependable, capable of continuous, 'round-the-clock operation.

OILGEAR Application-Engineered Heavy-Duty Pump and Control Systems for Line Pipe Carriages and Expanders.



Expander head drawing courtesy of A. O. Smith Corporation.



One of the Oilgear "Power-Paks" for this application

SOLUTION: An Oilgear custom-built "Power-Pak" — shown above — with four "DX-15025" Two-Way, Variable Delivery, Heavy-Duty Pumps direct-connected to 125hp electric motors, and mounted on a 300 gallon reservoir base provides any volume up to 432 gpm for each expander . . . easily expands line pipe accurately, uniformly as much as 1" in diameter. All pumps are piped to two manifolds so that only two pipe lines are required to the expander cylinder. Expansion ram speeds are infinitely variable up to 145 ipm — and return speeds to 284 ipm. Similarly, only two pipe lines are required to carry up to 104 gpm to the pipe-feeding carriage cylinder from an Oilgear heavy-duty "DX-6011" Two-Way, Variable Delivery, Pump direct-connected to a 40hp electric motor, mounted on a standard reservoir base. Two solenoids on each pump control instantly respond to remote pushbuttons and limit switches for manual, or semi-automatic control of both carriage and expander functions. Control devices and electrical circuitry are simple. There are no flow control valves or an excessive amount of piping to create heat and power losses . . . no reversing valves to originate shock or annoying shock-caused leaks — as both flow and pressure decelerate to zero before flow direction is reversed *within* the Oilgear Pumps, and then accelerate smoothly to preselected volume.

A. O. Smith states — "*. . . through the application of controlled internal pressure . . . we are able to provide pipe of substantially greater strength while still retaining necessary ductility.*"

Installation-Proved Performance — Oilgear Heavy-Duty Pumps and Control Systems on carriage and expander applications at A. O. Smith of Texas have provided over 10 years of service . . . and more than 5 years at the Milwaukee Plant — with many 24-hour-day, 6-day-week periods. *The entire production of line pipe has depended upon continuous pump service.* To speed operations and reduce production cycle time on both standard, and the new columbium steel line pipe — more Oilgear Heavy-Duty Pumps were recently added to the carriage and expander systems. This company — a user of Oilgear *Fluid Power* Equipment since 1922 on much of their unique, automated machinery and presses — is typical of the Oilgear users throughout industries all around the world who agree that . . .

"for the lowest-cost-per-year . . . It's OILGEAR!"

For dependable, practical solutions to YOUR rotary or linear drive and control problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements, directly to . . .

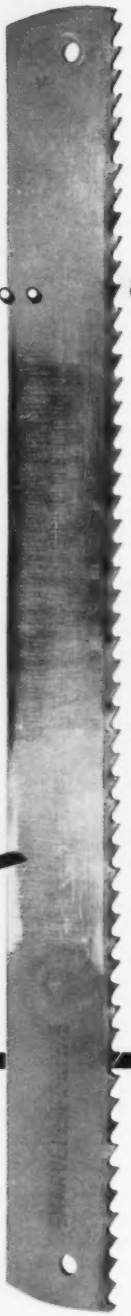
THE OILGEAR COMPANY

Application-Engineered "Any-Speed" Drive and Control Systems

1572 WEST PIERCE STREET • MILWAUKEE 4, WISCONSIN

Phone: Mitchell 5-6715 — Direct Distance Dialing Code — 414

RETIRED... after cutting 5600 pieces



You can hardly expect more cutting life from a hack saw blade that costs less than $3.00.

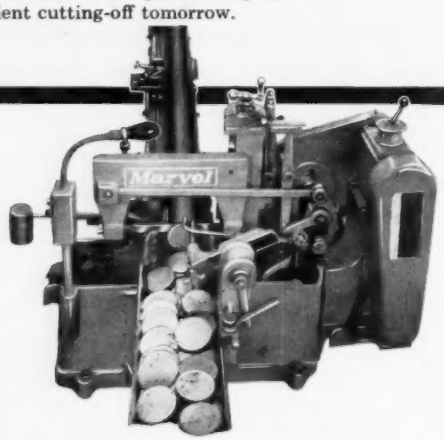
This unbreakable MARVEL High-Speed-Edge Hack Saw Blade was removed from a MARVEL Hack Sawing Machine after 9 hours and 30 minutes of sawing—during which time it cut-off 5600 pieces of ¾" round 1112 CR steel. 20 bars were nested and the blade made each cut through the nest in average time of 1 minute and 52 seconds!

Blade cost: 20 pieces for just one cent!

There was no machine down time or shortened blade life due to blade breakage. A MARVEL Blade will eventually wear out—but it won't break. You get every penny's worth of blade life you pay for when you buy *unbreakable* MARVEL High-Speed-Edge Hack Saw Blades.

Regardless of the make of your hack saw machines, you will get more cutting-off efficiency if you use MARVEL Blades. If your hack saw machines are MARVELS, equip them with MARVEL Blades. Together, they are an unbeatable combination.

Leading Industrial Distributors stock and sell MARVEL Blades. Order yours today for more efficient cutting-off tomorrow.



MARVEL *Metal Cutting* **SAWS**

BETTER MACHINES
BETTER BLADES

B-1130

ARMSTRONG-BLUM MANUFACTURING CO. • 5700 Bloomingdale Avenue • Chicago 39, Illinois

Splashed steel can't damage these Ingot Mold Cars

These Ingot Mold Cars shed splashed molten metal like a duck sheds water. A one-piece rolled steel deck with long side skirts protects the bearings, springs and wheels. Every part is designed for long service—to keep the car on the job and out of the repair shop.

United States Steel has been *making and using* ingot mold cars for 40 years. We build them to stand rough treatment. The five features shown at the right make these 4-wheel, 55-ton-capacity cars a money-saving investment.

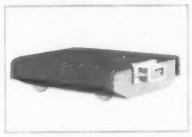
Our representative will be pleased to call at your convenience to discuss your requirements for this *or other types* of industrial cars. For more information, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

United States Steel Corporation • Columbia-Geneva Steel Division • Tennessee Coal and Iron Division • United States Steel Export Company

USS **United States Steel**

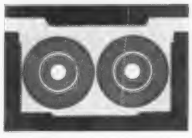
TRADEMARK

5 unique structural features make them better

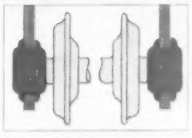


One-piece rolled steel deck with overhanging skirts protects bearings, springs and wheels from runover molten metal. Box construction is all-welded *rolled* plate.

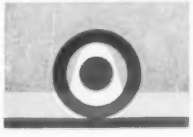
Engineered with safety factors: Designed for a 55-ton normal capacity load including ingots, molds and stools. Each car has a built-in safety factor of an additional 50% to withstand stripping thrusts.



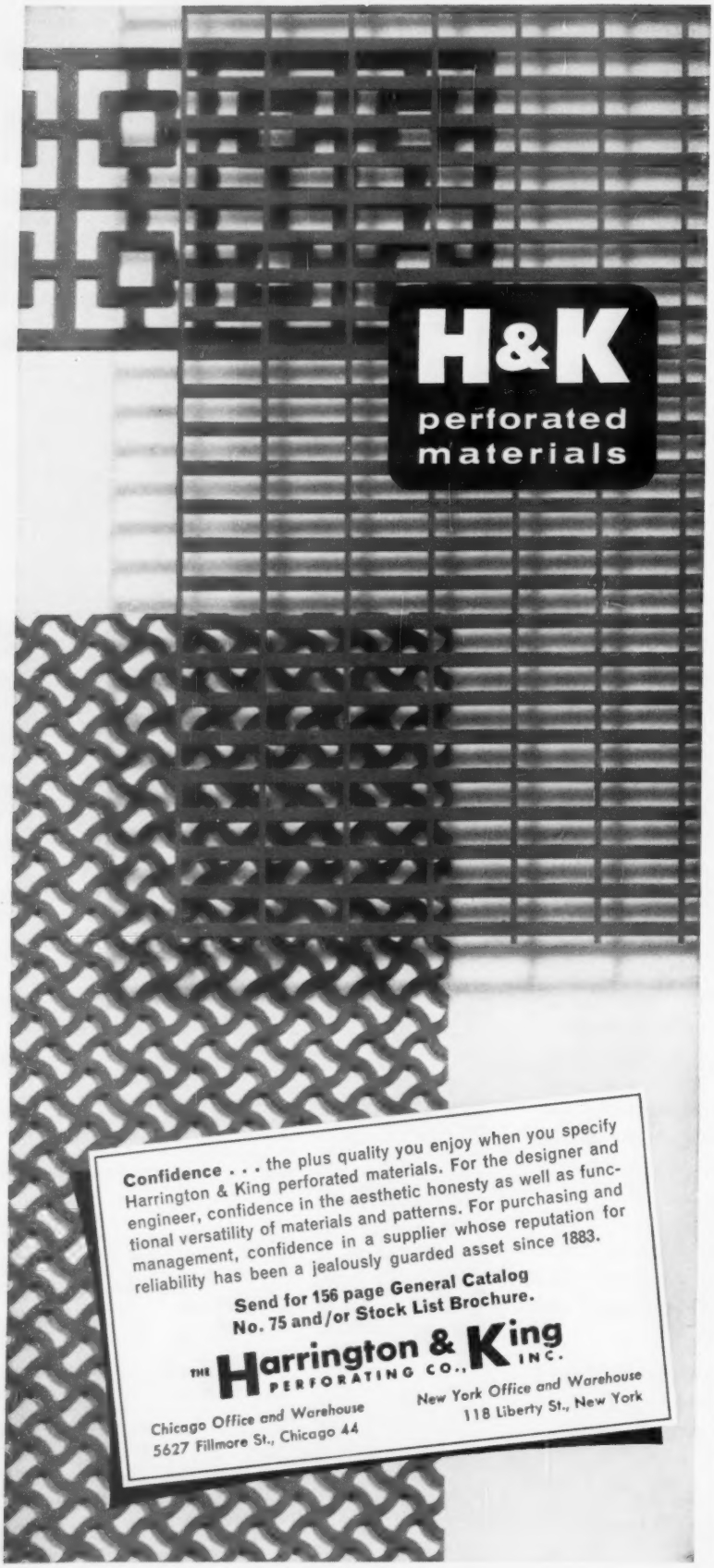
Sixteen coil springs: Two heavy coil springs for each wheel—plus two overload coils inside these—provide a shock-absorbed level ride, so important in hauling molten metal.



Anti-friction outboard bearings: Located outside each of the car's four wheels to minimize sideway and to provide long, smooth-running performance.



Multiple wear wheels: Forged steel wheels give several times the wear of cast wheels—save many a trip to the repair shop.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CALENDAR
OF MEETINGS

Dec. 27-29, American Marketing Association: Annual winter meeting, Biltmore Hotel, New York. Association's address: 27 E. Monroe St., Chicago 3, Ill. Executive director: Vance E. Lockhart.

Jan. 8-12, Society of Automotive Engineers Inc.: Annual engineering congress and exposition, Cobo Hall, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: Joseph Gilbert.

Jan. 14-17, Institute of Scrap Iron & Steel Inc.: Annual meeting, Statler Hilton Hotel, Washington. Institute's address: 1729 H St. N.W., Washington 6, D. C. Executive vice president: William S. Story.

Jan. 15-17, AIME Minnesota Section and University of Minnesota: Annual iron ore mining symposium, Hotel Duluth, Duluth. Contact: Fred E. Berger, director, Center for Continuation on Study, University of Minnesota, Minneapolis 14, Minn.

Jan. 15-19, Steel Plate Fabricators Association: Annual meeting, Mountain Shadows Hotel, Scottsdale, Ariz. Association's address: 105 W. Madison St., Chicago 2, Ill. Secretary: J. Dwight Evans.

Jan. 17, Engineers Joint Council: Annual meeting, Biltmore Hotel, New York. Council's address: 345 E. 47th St., New York 17, N. Y. Secretary: L. K. Wheelock.

Jan. 17, Metallurgical Society of AIME: Mechanical working conference on flat rolled products, Pick-Congress Hotel, Chicago. Society's address: 345 E. 47th St., New York 17, N. Y. Secretary: R. W. Shearman.

Jan. 18-19, National Industrial Conference Board Inc.: General meeting, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Jan. 22-23, Industrial Heating Equipment Association Inc.: Annual meeting, Drake Hotel, Chicago. Association's address: 2000 K St. N.W., Washington 6, D. C. Executive vice president: Robert E. Fleming.

Jan. 22-25, Plant Engineering & Maintenance Show: Convention Hall, Philadelphia. Contact: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Jan. 23-24, Steel Shipping Containers Institute Inc.: Meeting, St. Regis Hotel, New York. Institute's address: 600 Fifth Ave., New York 20, N. Y. Secretary: L. B. Miller.

TIPS FROM A ROLL MAKER'S NOTEBOOK

MACKINTOSH-HEMPHILL DIVISION, E. W. BLISS COMPANY, Pittsburgh 3, Pennsylvania

Cast mill rolls • cinder pots • rotary tube straighteners • end-thrust bearings • heavy-duty lathes • steel and special alloy castings

How to get the most from cogging hammer dies

For many years, we have supplied cast steel dies that are used for cogging ingots into billets and blooms. During this time, we've been aware of the variation in the service life of identical dies used in different plants under apparently similar conditions. As a result, we have tried to find out the cause.

HERE IS WHAT WE HAVE FOUND

Tricks of fitting spell the difference: Each blow of a drop hammer generates tremendous pressure at the moment of impact. For a 5-ton hammer, this pressure could approximate 10,000 tons. Hence, it is vitally important that the faces of the top and bottom dies be exactly parallel. Equally important is close fit of the dies in the top and bottom die holders.

The hot forming department at Universal-Cyclops' Titusville, Pa., plant gets the longest cogging hammer die life that we know of. Thus, a close look at Titusville's practice should be helpful.

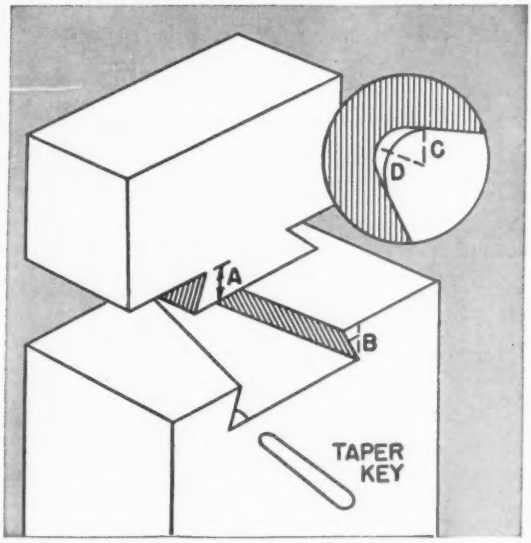
You can't argue with success: Let us take a specific case — the adjustment and fit of the bottom die in the sow block of one of Universal-Cyclops' 5-ton hammers (all remarks on tolerances apply equally to the fit of the top die in its holder).

Starting with new dies, the face of the shank key is machined to zero, and the wings are machined as close to the 3" setback as possible. Actual tolerance limits here are 3" min. and 3.004" max., making the die key face at most .004" high.

After extended use, the 16,000-pound sow block may shift slightly, causing the dies to go out of parallel as much as 5/8". Before removal for redressing, parallelism of the dies is checked, and if necessary, the face of the bottom die is machined to bring it into parallel with the top die.

Avoid weak points: Close seating tolerances are not the only prerequisites for maximum die life. Areas of potential structural weakness must be carefully avoided. For example, the fillet radius at the corner where the die shank key joins the die wing and the mating radius in the die holder should leave a space enough to sight between the die and holder. Universal-Cyclops uses 3/8" and 1/2" as these complimentary radii.

The angle of the shank key from the vertical is purposely kept to 7° for best performance. The greater the angle, the more the shearing effect as the relatively light die rebounds from the heavy anvil after each blow, tending to tear the shank.

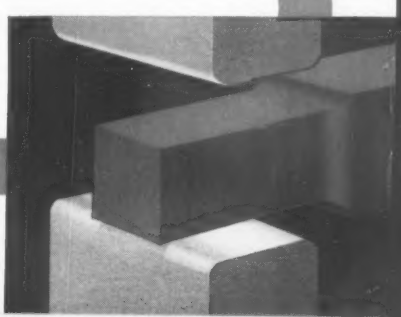


Dimension A is 3.000" + .004". Angle B should be held to 7° from the vertical. Radius C is 3/8"; Radius D is 1/2".

To guard against shank retaining keys breaking off, Universal-Cyclops blues the key with chalk before seating it, and then checks it for uniform contact along the angled and tapered faces. Moreover, care is taken to make sure that the key isn't so high that it touches the wing of the die.

Choice of dies: Mack-Hemp "Red Top" cast steel dies are a development of our long experience in slabbing and blooming mill rolls. Their remarkable resistance to peening, "mushing," spalling and other varieties of wear has been proven time and again in open die forging work. If you start with Red Top dies and then follow the suggestions made above, we guarantee improved performance from your cogging hammers.

For help with your specific problem, whether it involves forging dies or mill rolls, simply write or telephone us at HE 1-3000, or send for our free Hammer Die Bulletin.



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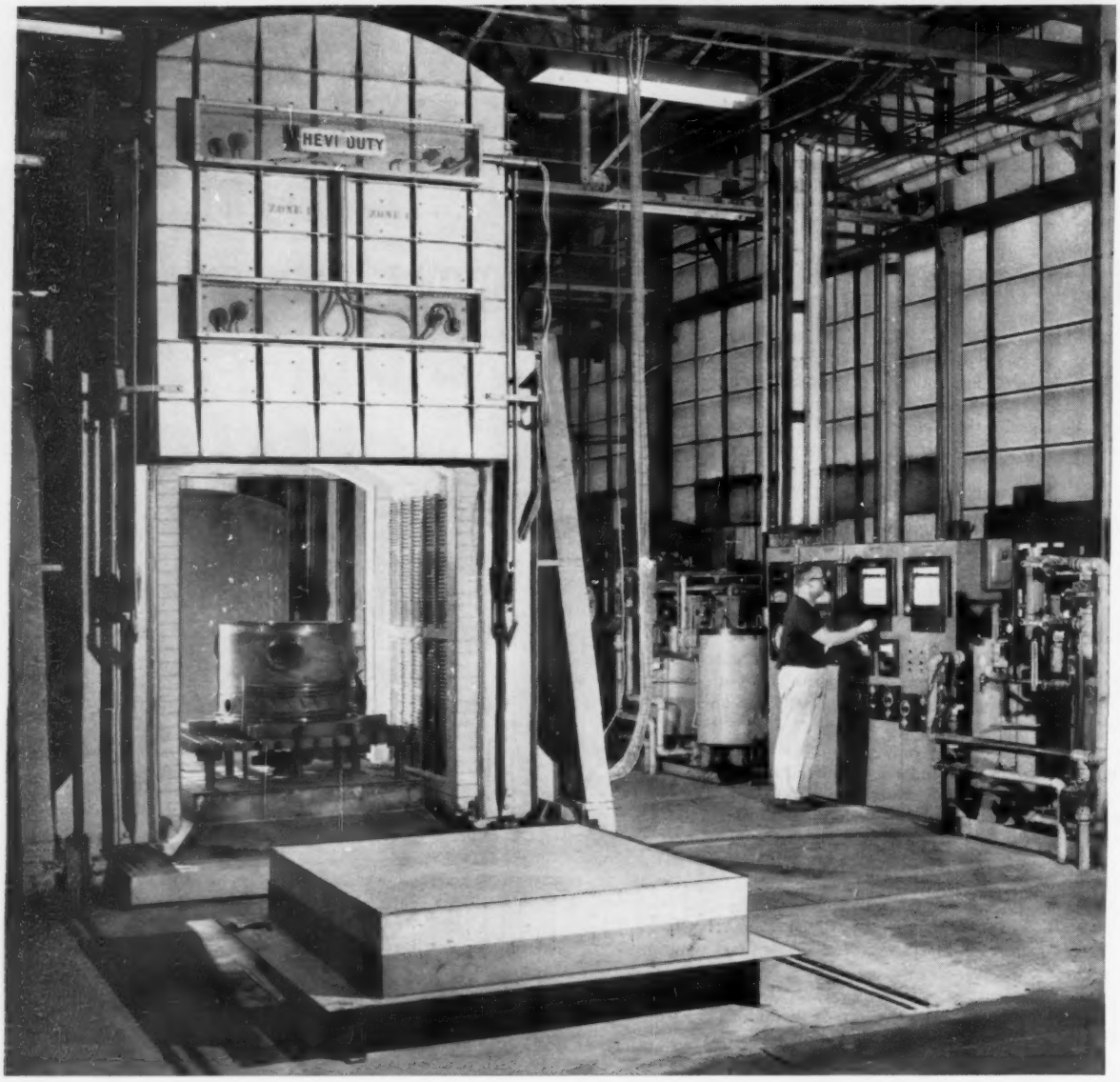

Special car bottom furnace moves to the work... solves head room problem, holds ± 10°F accuracy

Tapco Group, Thompson Ramo Wooldridge, Inc., Cleveland, wished to use bell furnaces but lacked necessary head room in the heat-treating area. Hevi-Duty engineered the perfect solution.

A special car bottom furnace was designed. It moves over the load . . . in contrast to the usual car bottom furnace where the load moves into the furnace. Two pedestals are used to permit continuous use of the furnace. Atmosphere-type retorts allow for slow cooling while a second load is being heated in the furnace . . . thus the furnace is used 24 hours a day . . . seven days a week.

Operating in the range of 1200°F, the furnace holds temperature uniformity to ±10°F. Work being tempered or stress relieved in this furnace has actually come out brighter than when it entered.

In more than four years of operation neither this Hevi-Duty car bottom furnace nor a duplicate furnace, installed a short time later, has required replacement of heating elements.

Talk with Hevi-Duty about your next heat-treating project. For information about a full line of electric or fuel-fired industrial furnaces and ovens, call your Hevi-Duty sales representative or write to Hevi-Duty, Watertown, Wisconsin. H-35-61

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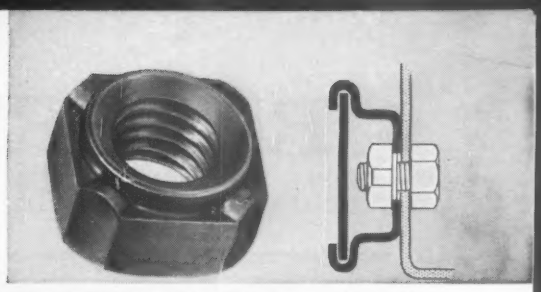

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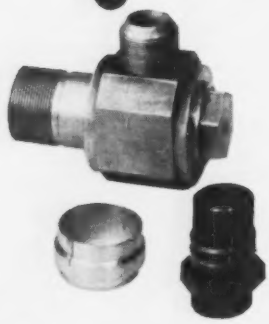
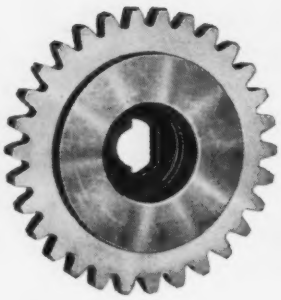


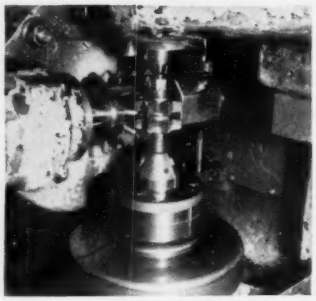
CUTS PRODUCTION COST 50% for Flodar Corp.

This manufacturer of high pressure hydraulic tube and pipe fittings reports production cost savings of 50% after switching from 4150 to Rycut® 50 and from 4140 to Rycut 40. In addition to higher production, Rycut machined to a better finish, held size perfectly and eliminated scrap loss. (With 4140 and 4150 scrap loss ran up to 30%.) And tool life, from 1 to 3 hours with the standard alloys, was boosted to 8 hours with Rycut.



MACHINES 35% FASTER for American Bosch

Rycut 40 was selected by American Bosch for this plunger drive gear for a diesel injection pump because it machines 35% faster than 4140—keeping machining costs at a minimum without sacrifice of mechanical properties. The company also found that Rycut 40 produced a better finish than 4140 and reduced down time by lengthening tool life.



BOOSTS SPROCKET PRODUCTION for McCulloch Corp.

These are the results obtained at McCulloch Corporation when they switched from non-leaded alloy to Rycut 20 for chain saw sprockets. Turning, forming, reaming and drilling operations: hourly production rate raised from 68 to 100 pieces—tool life lengthened from 3½ to 5 hours. Hobbing machine operations: hourly production raised from 43 to 65 pieces—tool life lengthened from 3916 parts per tool to 5874.

Rycut is available in a wide range of analyses: Rycut 20 is a case carburizing, oil hardening steel, with balanced composition. Rycut 40 annealed attains greatly varied strength and toughness, depending on heat treatment, making it suitable for an unusually wide range of applications. Rycut 50 annealed may be preferred (to Rycut 40) for parts with large mass or applications requiring higher mechanical properties. Rycut Heat Treated, stress relieved, assures uniform properties and machinability—carbon content is matched to bar size. Call Ryerson for any alloy requirement—and get top technical help, too.

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Business Activity to Rise 9 Per Cent Next Year

Business activity will continue to rise in 1962, and national output will top this year's by 9 per cent, forecasts Paul W. McCracken, professor of business conditions, University of Michigan, and former member of President Eisenhower's Council of Economic Advisers. He says a gross national product of $565 billion to $570 billion is a reasonable expectation if consumers "let go of their income dollars at more traditional rates." Facts bearing on his outlook: A Federal Reserve policy which is conducive to expansion, evidence of a boost in expenditures for equipment and facilities, and a projection of increased federal spending.

Cold Finished Bar Producer Sees Sales Rising into 1962

"Our November bookings ran more than 30 per cent above the October tally," observed F. J. Robbins, president, Bliss & Laughlin Inc., during the dedication of the firm's new mill at Medina, Ohio. (See Page 131). "We're confident the sales rise will continue into mid-1962—there's some inventory buildup." But Mr. Robbins sees a slump in his firm's earnings in 1961. "Our profits can't be greater unless we increase product prices. We'll wait for basic industry to lead the way on that."

Electronics Sales Hit All-Time High

Growing military and industrial markets are boosting factory sales of the electronics industry to an all-time high this year and will push them still higher next year, says L. Berkley Davis, president, Electronic Industries Association. Here are his comparative figures for the 1959-62 period:

	Factory Sales (In billions)			
	1959	1960	1961	1962
Consumer Products	$2.0	$2.1	$2.0	$2.1
Industrial Products	1.6	1.75	1.9	2.1
Military Products	4.7	5.0	5.3	5.6
Replacement Components	0.9	0.9	0.95	1.0
Totals	$9.2	$9.75	$10.15	$10.8

Industry Notes

For the sixth consecutive month, manufacturers' shipments of domestic gas ranges in October showed marked improvement over the year ago period, reports the Gas Appliance Manufacturers Association . . . The National Welding Supply Association says that sales in both the third quarter and the first nine months of this year topped the corresponding 1960 periods by 5 per cent . . . Net domestic orders increased 38 per cent from September to October, says the Industrial Heating Equipment Association . . . The Industrial Fasteners Institute reports October shipments were 93 per cent

of the 1956-58 average—down 2 points from the August-September level . . . Bookings increased 27.9 per cent during October in the gearing industry, says the American Gear Manufacturers Association.

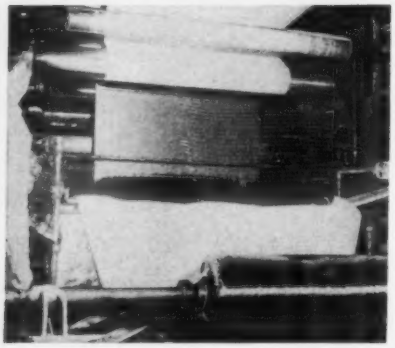
PAs Report 'Amazing Resistance' to Higher Stock Levels

The November survey of the National Association of Purchasing Agents indicates that spotty weaknesses still plague business. Both new orders and production figures show a pause in their improvement, as the majority of respondents describe their operations as the "same." In October, the majority claimed "better" conditions. While a "small degree of accumulation" has been noted in the last two months, the figures point to an "amazing resistance" to high stock levels. Upward pressures on prices appear to be lessening—74 per cent of the agents report no change (up from the 72 per cent in October).

Layoffs May Cost You More in '62

Unemployment Benefit Advisors Inc., Washington, an employer group studying unemployment compensation in all states, predicts industry outlays will hit $3.5 billion in 1962—up 16 per cent from this year's. The tax, which is levied solely on employers in most states, is a sizable production cost, and indications are that it will continue to increase. Yet, as Russell I. Johnson, manager, Data Processing Dept., Caterpillar Tractor Co., Peoria, Ill., remarks: "Too many employers—perhaps more than 50 per cent of them—do nothing in the control of unemployment compensation taxes." For some tips on what you can do, see Page 47.

Wire, Paper Combine to Make Versatile Fabric



Cold drawn steel wire and paper are being wedded to form a new versatile fabric. Introduced at Arkell Safety Bag Co.'s Newport News, Va., plant, the material is said to bend easily like paper yet hold its shape like steel. Applications might include: Superstrong bags, tarpaulins, snow fence, livestock shelters, irrigation piping, dropcloths, and disposable clothing.

How to Get Ahead in Business

Few business decisions remain as unscientific and irrational as the selection and advancement of management personnel, says Samuel A. Pond, associate dean, Stanford Graduate School of Business. For middle managers who want to fight this tendency and work their way to the top, Mr. Pond offers these suggestions: 1. Know what you want and say so. 2. Know what you like and do best. 3. Seek opportunities to diversify your experience. 4. Choose the organization that is right for you. 5. Pick your boss carefully—when possible.

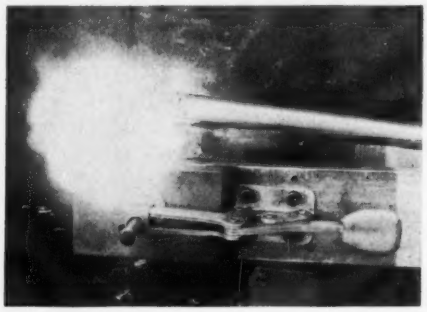
Nippon Kokan to Triple Steel Capacity

Shige Kawata, president, Nippon Kokan K.K. (Japan Steel & Tube Corp.), has announced plans to invest more than $1 billion in new plant and equipment to triple the firm's steel capacity by 1970. Current capacity: 2.3 million tons. Up to 30 per cent of the funds may come from private sources in the U. S. Says Mr. Kawata: "Equipping our new plant will involve important purchases of heavy machinery from the U. S. and, upon completion, greatly expanded imports of American iron ore and coal."

Russia Is Not Stockpiling Aluminum

The rumor that Russia is stockpiling aluminum for later "dumping" on the world market apparently isn't true. The aluminum that became available when the USSR cut back its aircraft production is being channeled into such products as electrical cable and transportation equipment. An official of a leading U. S. aluminum company told STEEL that Russia will likely be using more aluminum than it produces for some time. When dumping charges were brought against Russia in 1958 for its disposal of the metal on the British market at a low price, it was determined that the primary motive was to obtain foreign exchange.

Magnetic Forming Shapes Up as Practical Tool



The exploding coil is doing magnetic forming — a newcomer to the list of production tools employing explosive energy. General Dynamics Corp.'s Magneform machine uses magnetism to collapse, expand, or compress metals. To learn how the technique works and what it can do, see Page 92.

Carrier Corp. Workers Reject Industrial Union

More fuel has been added to the fire under the AFL-CIO kettle with the recent 2 to 1 decision by employees of Carrier Corp., Syracuse, N. Y., to make the Sheet Metal Workers their bargaining agent. Their former representative, the United Steelworkers, has been on strike since early 1960. The SMW has organized the workers, despite AFL-CIO orders to "cease and desist" such activities, and heightened the craft vs. industrial union battle.

Studebaker-Packard Workers Hold Special Meeting

Studebaker-Packard Corp. workers were scheduled to meet yesterday, Dec. 10, to decide whether to accept a company proposal which incorporates a cut in wages and fringes. Although the union considers the proposal unacceptable.

STEEL
The Metalworking Weekly

December 11, 1961 Vol. 149 No. 24

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Engineering Index Inc.
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it called the meeting. The UAW international has authorized a strike if it becomes necessary, but no strike deadline has been set. The contract has been extended on an hour-to-hour basis since Nov. 30.

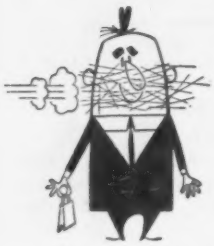
Engineer Shortage Growing More Critical

In 1950, the U. S. graduated 52,700 engineers. The number dropped to 37,800 in 1960 and will fall to 32,000 by 1965, says the Engineering Manpower Commission. In sharp contrast, the growing demand for engineers may average 81,000 a year in the 1961-70 period. The commission notes that freshman engineering enrollments have declined four years in succession (from 10.8 per cent of freshmen in 1957 to less than 7 per cent this year).

Brazing Alloys Producers Charged with Price Fixing

Five brazing alloy manufacturers have been indicted on charges of fixing prices and attempting to force distributors to adhere to those prices. The firms produce 92 per cent of the country's brazing alloys. They are: Westinghouse Electric Corp., Handy & Harman, Engelhard-Hanovia Inc., Engelhard Industries Inc., and United Wire & Supply Corp. Also named were eight officials of the firms.

Straws in the Wind



American Can Co. and National Can Co. will boost their prices nearly 2 per cent on Jan. 1 . . . The number of major areas with substantial unemployment dropped to the lowest level of the year in November, says the Labor Department . . . The National Coal Association's board has approved a research, promotion, and marketing program to boost markets to 500 million tons a year. Estimated cost for the first year: $500,000 . . . Volkswagen Canada Ltd. is buying some Canadian parts for German-made cars shipped to Canada . . . Shipments of fabricated structural steel climbed 9 per cent in October, says the American Institute of Steel Construction . . . Scaw Metals Ltd., Johannesburg, South Africa, and Tube Investments Ltd., London, will install continuous casting facilities to make carbon steels. Both will use the process developed by Concast A. G., Zurich, Switzerland.

Metalworking Pulse

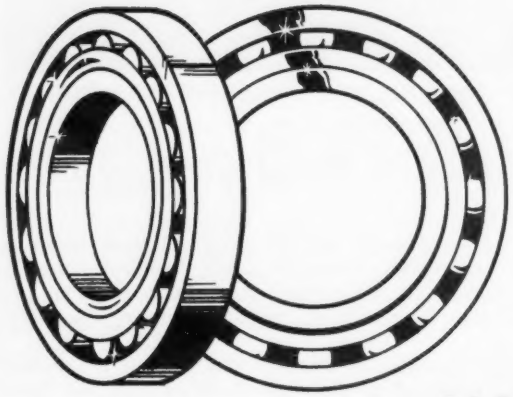
The Business Trend: Rebounding from the Thanksgiving Week, STEEL's industrial production index moved to the highest point of 1961 at a preliminary 178. Auto and steel production were the prime movers. **Autos:** Weekly schedules until Christmas are expected to stay near 160,000 units. Sales and production rates are nearly even, keeping inventories relatively low. **Steel:** Ingot production continued to rise, hitting a peak for the year to date.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49 = 100)
  Week ended Dec. 2 . . . . . **178†**
  Year ago **148**
  Details on Page 67
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Dec. 9 . . **160,000***
  Year ago **135,328**
  Details on Page 64
- **STEEL INGOT OUTPUT (TONS)**
  Week ended Dec. 9 . **2,100,000***
  Week ago **2,073,000**
  Details on Page 131

†Preliminary. *Estimated.

NEWS!

KAYDON NOW REDUCES PRICES ANOTHER 25% TO 42% FOR "CP" BALL RADIAL BEARINGS AVAILABLE "OFF-THE-SHELF"



Low prices are also being quoted on many other ball and roller bearings ...both standard (4″ bore and larger) and special (2″ bore and larger).

You can now save on many of your current and future purchases of these bearings.

Send your inquiry now! Write, wire, or call Kaydon, Muskegon, Michigan. Phone: PLaza 5-3741.

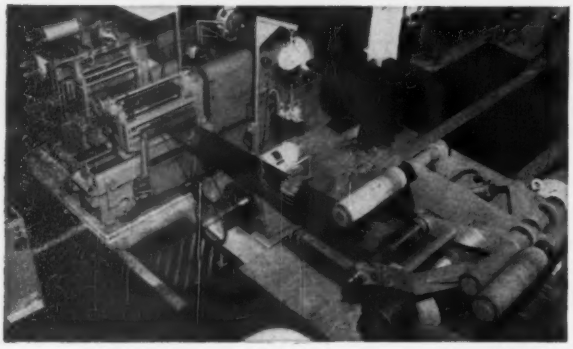
K-619

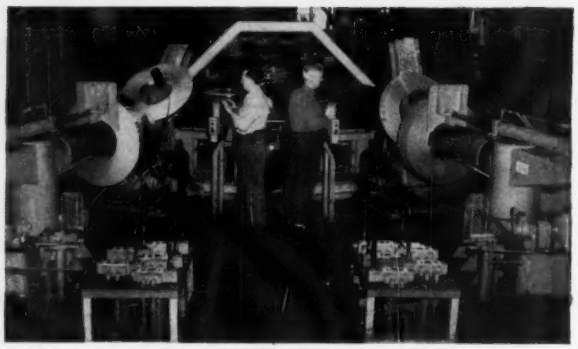
20TH YEAR KAYDON 1951 PRECISION

THE KAYDON ENGINEERING CORP.
•MUSKEGON, MICHIGAN

All types of ball and roller bearings — 2″ inside diameter to 178″ outside diameter . . . Taper Roller Roller Thrust • Roller Radial • Needle Roller • Ball Radial • Ball Thrust • Four-Point Contact Bearings

Predictable Performance...





SECO Slitting Installation, Superior Steel Division, Copperweld Steel Company, Carnegie, Pa.

is automatic—start to finish—with a SECO *Slitting Line*

SECO STEEL MILL EQUIPMENT

- Leveling and Shearing Lines
- Combination Edging and Flattening Lines
- Tension Reels for Strip Polishers
- Narrow Strip Grinding Machines
- Slitting Lines
- Multiple Strand Pull-out Rolls and Take-up Frames
- Strip Coilers (Up and Down Type)
- Traverse Reels for Narrow Strip
- Steel Coil Up-enders
- Scrap Ballers

Affiliated with Lee Wilson Engineering Co., Inc.

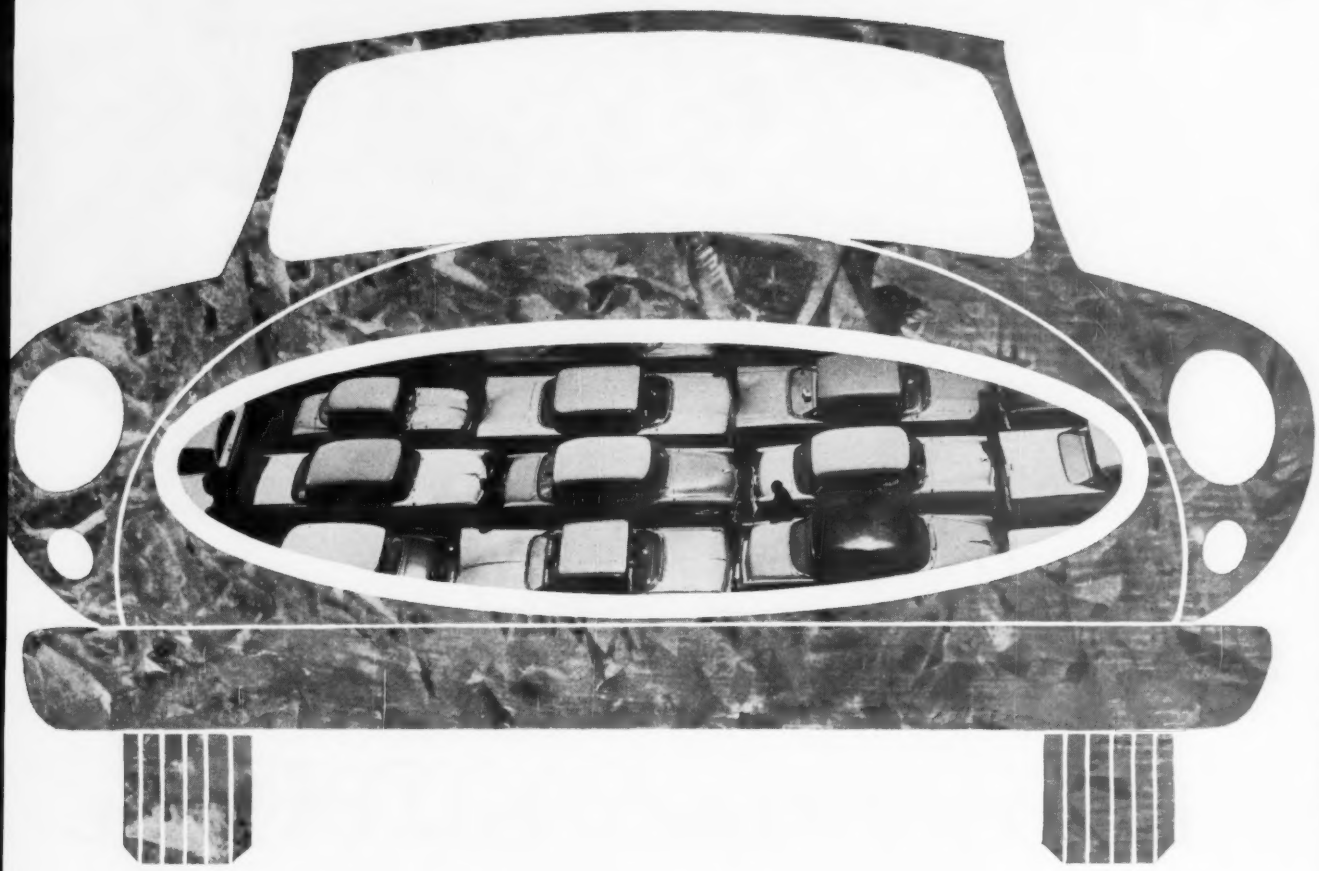
Every operation in this *complete* slitting line by SECO—from entry to exit of coils—is fully automated. It was specifically designed and built by SECO to meet the maximum performance requirements of the Superior Steel Division, Copperweld Steel Company, Carnegie, Pennsylvania.

SECO's staff of experienced sales engineers, specialists in production problem solving, are prepared to show you how you can get "predictable performance" in *your* operation—whatever your requirements. Call or write today. West Coast representative: United Machine Tool Company, Los Angeles, California.

STEEL EQUIPMENT COMPANY

P. O. BOX 737, WARRENSVILLE STATION • CLEVELAND 22, OHIO

More parts in more new cars fend off corrosion . . .



GUARDED BY GALVANIZED STEEL

In 1960 the Motor City consumed a massive 218,964 net tons of galvanized steel sheets to fight car corrosion. That's 38% more than was used in 1959 and over 700% more than in 1954.

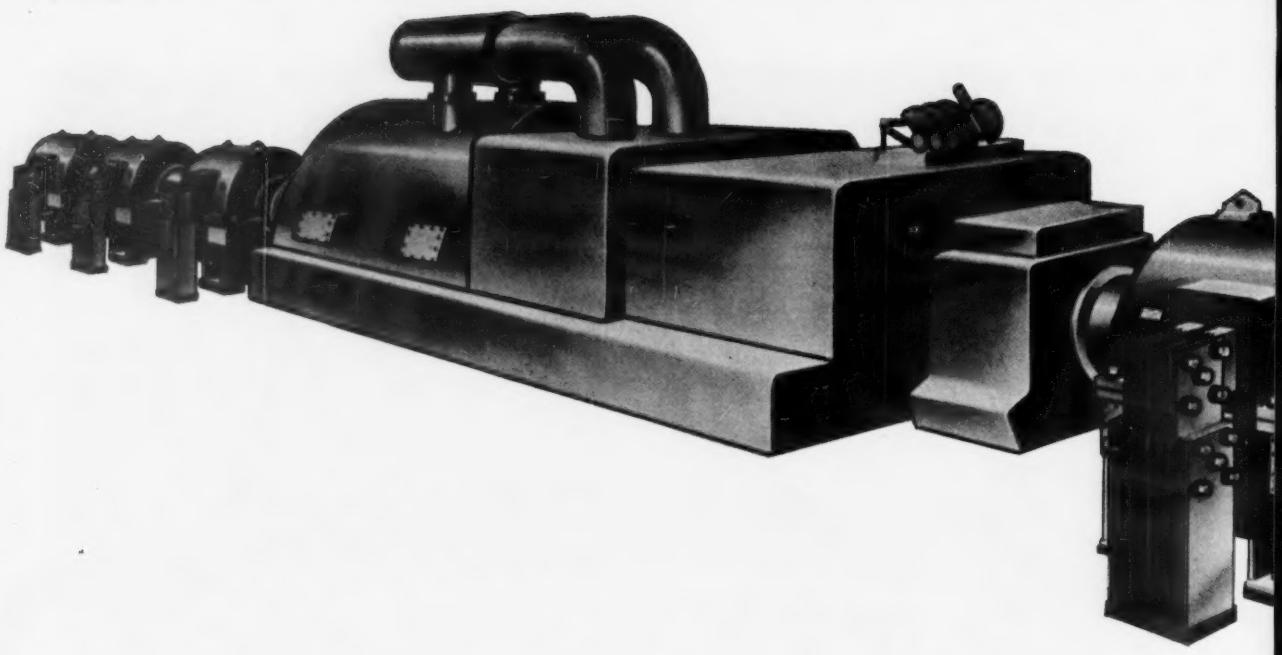
In the average compact car, for instance, Detroit now uses over 100 pounds of corrosion-resistant galvanized steel sheets. The results are numerous and notable: Car owners are getting greater durability and a sharp drop in maintenance costs and headaches. Manufacturers are getting the cost reductions inherent in galvanized steel's simplified fabricating procedures. Head and tail lamp housings, for instance, formerly required five or six steps when zinc plated or painted after stamping. Now they are moved direct from press to assembly line with their tight zinc coatings completely undamaged by fabrication. The same economies apply to side members, rocker panels, front and rear rails and cross members.

WEIRKOTE,® IN PARTICULAR! Widely used Weirkote is a natural for automotive applications, and the auto industry has been quick to put it to extensive use. To the inherent strength, economy and versatility of steel, Weirkote adds enduring zinc protection that can be worked to the very limits of the steel base without chipping or peeling. This superior product is the end result of years of experience and technical research devoted to coating steel sheets with zinc. Weirkote is manufactured by two National Steel divisions, Weirton Steel and Midwest Steel. Write Weirton Steel Company, Weirton, West Virginia, for further details.

MIDWEST STEEL
Portage, Indiana

WEIRTON STEEL
Weirton, West Virginia

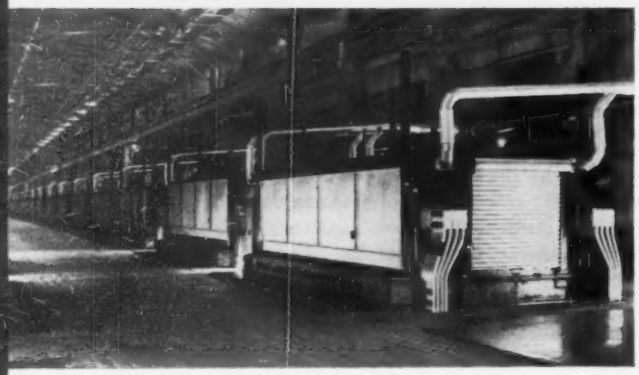
Divisions of
NATIONAL STEEL CORPORATION



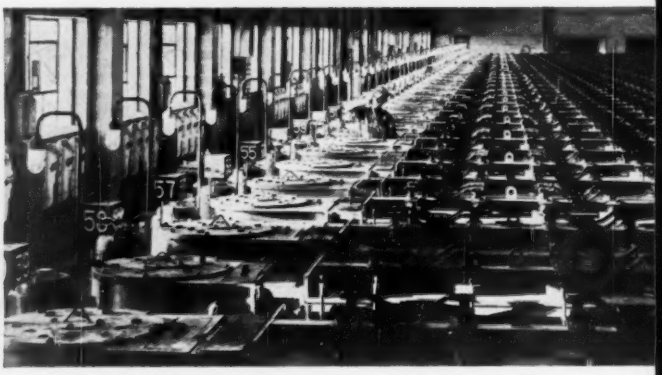
NOW

FROM GENERAL ELECTRIC

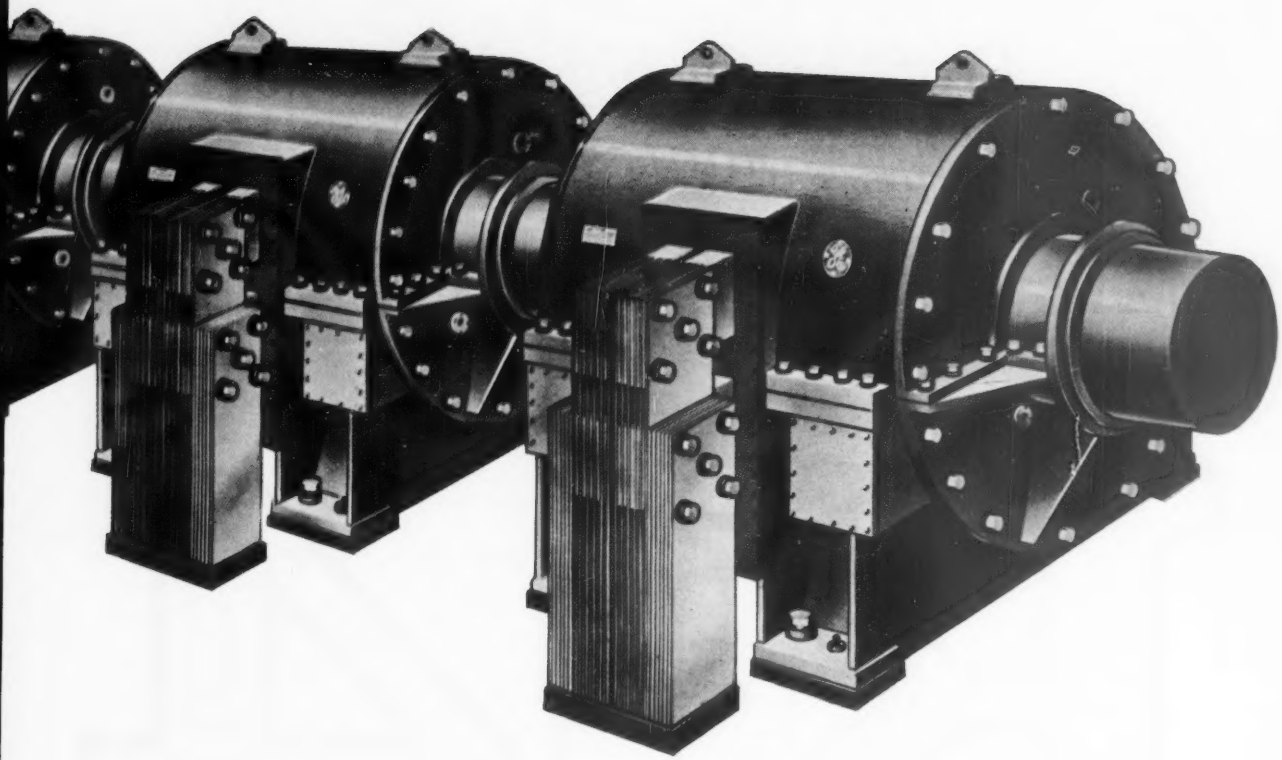
THE FIRST PRACTICAL



ALUMINUM REDUCTION pot lines require up to 150,000 amperes. The top of the page shows six *ACYCLIC* generators driven by a single steam turbine to provide a pot line with 150,000 amps, 400 volts.



CHLORINE PRODUCTION cells also require the high current which General Electric *ACYCLIC* generators can provide. A typical chlorine cell line could be powered by three *ACYCLIC* generators in series at 200 volts.



ACYCLIC GENERATOR

FOR EFFICIENT GENERATION OF VERY HIGH D-C CURRENT

The six ***ACYCLIC*** generators shown above will produce 150,000 amperes, 400 volts d-c at above 98 percent generator efficiency. The secret: a century-old principle and a recent G-E breakthrough in dynamoelectric design.

The first generator, developed early in the nineteenth century, embodied the principle of acyclic generation—high-current d-c power produced directly rather than through commutation. But the acyclic principle required an effective means of current collection to be practical, and the only methods available were complex sliding brush systems.

Now, General Electric has developed a brushless liquid metal collector system which transfers current efficiently even with hundreds of thousands of amperes coursing through it.

Aluminum pot lines, chlorine cell lines and a host of special applications require the large volumes of high-current d-c power which these ***ACYCLIC*** generators can produce.

If you require high-current d-c power, investigate this new look in generation. Call your General Electric industrial sales engineer or write Section 772–10, General Electric Co., Schenectady, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Large Motor & Generator Dept.
Schenectady, New York

Profit by the big advantage plant after plant is already using . . .

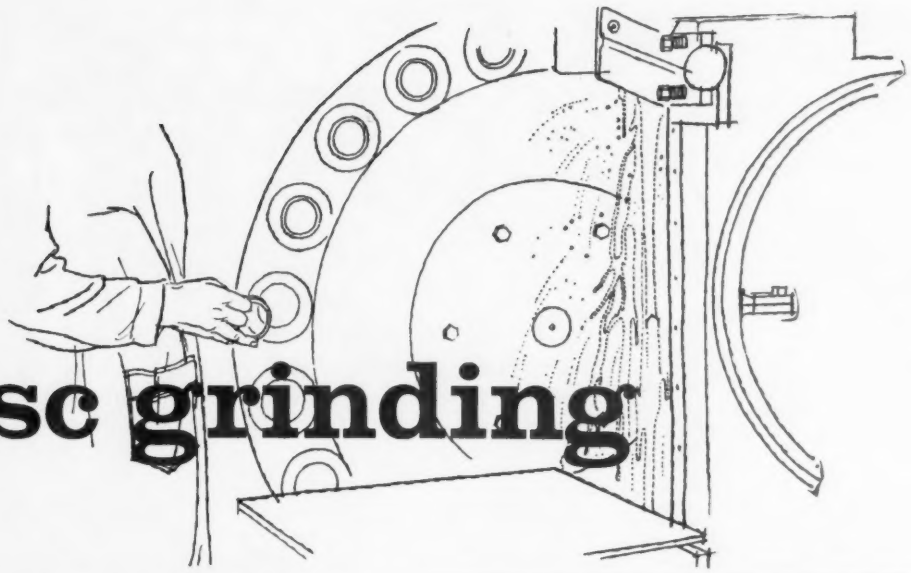
Hit that new high in

with

B14

New Norton Resinoid Bonded

DISCS



disc grinding

Throughout the country plant after plant is showing real enthusiasm for the new economy — and profits — the Norton-developed B14 resinoid bond has brought to the finest disc wheels ever made.

Development of the new B14 bond involved not only improvements in bond material but entirely new processing.

It took several years to perfect these changes. It also took many months to complete nation-wide testing of the new B14 discs, on all types of disc grinders — horizontal or vertical spindle, single or double — on jobs ranging from snagging to precision finishing, and on ferrous, non-ferrous and non-metallic materials. Also, the tests were entirely comparative — not only against competitive wheels but against Norton discs which were then standard.

Results of this across-the-board testing are outstanding. The new B14 discs have proved beyond question their ability to grind more workpieces per disc . . . faster and better, with fewer dressings . . . and with constant uniformity throughout extra long disc life.

Let new B14 discs bring you proof of better lower cost surfacing. Have your Norton Man, a trained abrasive specialist, study your requirements and make trial runs of the B14's you need — solid discs or segmental, ALUNDUM* or CRYSTOLON* abrasive. Or get details from your Norton Distributor. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

A few of very many reports from Norton customers . . .
PROVING B14 DISCS THE BEST

JOB: Rough grinding iron castings, 3½" x 2½",

REPORT: **B14 37 CRYSTOLON wheel ground 6,000 parts with one dressing. Best previous disc gave 4,500 parts with 4 dressings.**

JOB: Surfacing cold rolled steel washers on double disc machine.

REPORT: **B14 19 ALUNDUM discs impressive as best so far, with very even wear.**

JOB: Through-feed grinding of 52,100 steel bearing races.

REPORT: **B14 ALUNDUM disc very free cutting, clean and cool. Longer life than previously used Norton disc.**

JOB: Double-disc grinding Alnico magnets.

REPORT: **B14 mixed-abrasive wheel thoroughly approved for new orders.**

JOB: Double-disc grinding abrasive sticks.

REPORT: **B14 37 CRYSTOLON disc gave improved rate of cut. More abrasive sticks per disc-dressing.**

JOB: Rough grinding miscellaneous parts on double end machine.

REPORT: **B14 44 ALUNDUM disc performed better, lasted longer than all types.**

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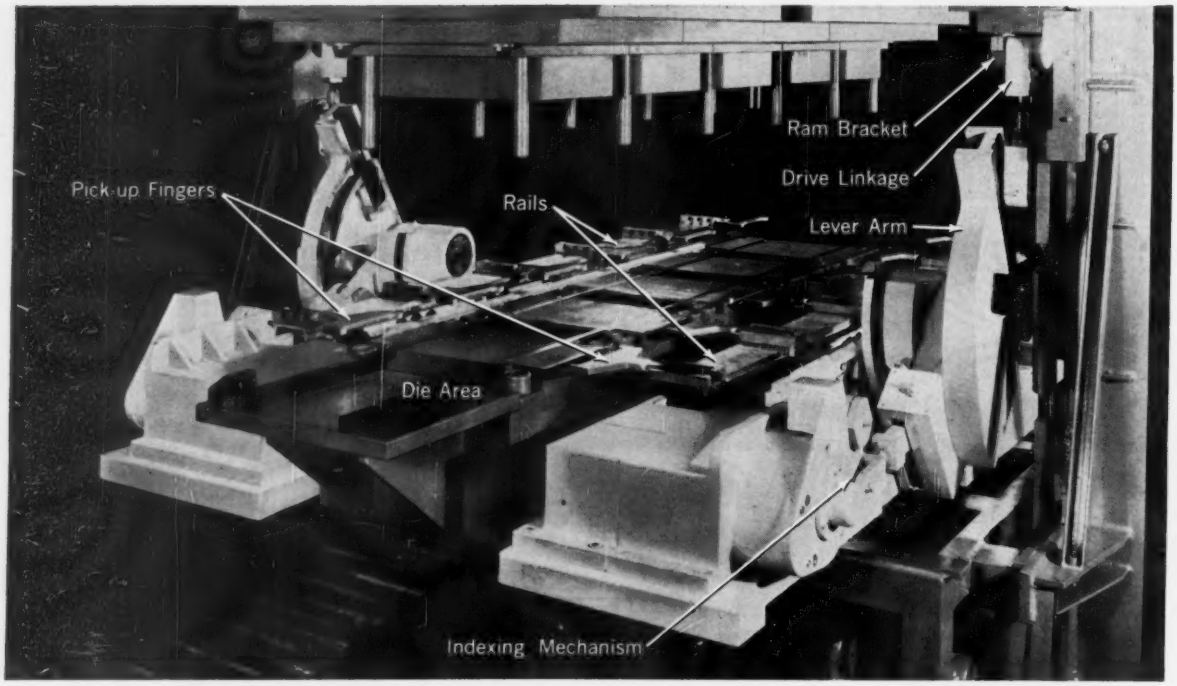
ABRASIVES

W-2009

Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes



Automate your presses... for BIGGER profits!

Increase your production, improve the quality of your products and get your manufacturing costs down—with your present equipment.

This happy position is being enjoyed now by users of Sheffield PRESS-PACERS—demountable transfer devices which automate any straight side press or line of presses. Parts can be transferred from die to die in one press, or between presses in lines up to more than 125 feet long.

One press can be made to do the work of as many as five or six presses, reducing equipment and space requirements. The number of transfer operations is limited only by the capacity of the press or line of presses involved. Automatic handling from press to press prevents scrap generated by manual handling.

PRESS-PACERS are completely flexible. They have been tooled to handle interchangeably as many as seven parts. Model or engineering changes do not obsolete a PRESS-PACER—they only increase its value.

Blanks, pre-drawn parts, sheet and coil stock may be used, as desired. Feed fingers are interchangeable—feed distance is adjustable.

Sheffield provides complete single-source responsibility in PRESS-PACER production including (1) design and build tooling, (2) building of standard PRESS-PACER, (3) provision for minimum scrap and scrap removal, and (4) installation in your plant, warranted to perform to specifications and your satisfaction.

You can see eight different PRESS-PACER installations right in your plant by means of a sound movie in color—and discuss your opportunity for savings with a factory engineer . . . write, wire or phone Contract Manufacturing Division.

The **SHEFFIELD** *Corporation* *Dayton 1, Ohio*

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Gages, Measuring Instruments, Automatic Gaging & Assembly Systems • Machine Tools • Contract Mfg.

NATIONAL CARBON COMPANY'S

CARBON AND GRAPHITE NEWS

DECEMBER, 1961
Vol. 8 No. 2

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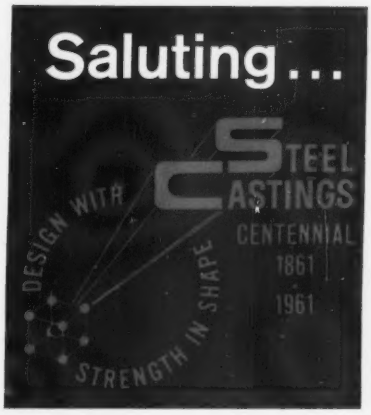
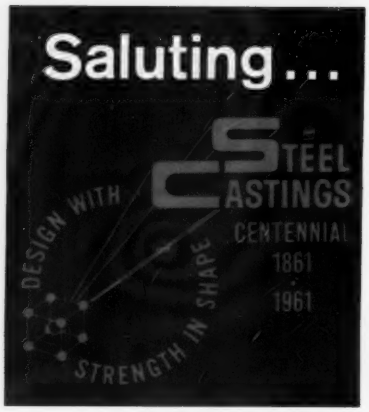


Progressive Foundries move ahead with Electric Arc Furnaces

ADVERTISEMENT

Progressive Foun With Electric



A century ago the steel casting industry in the United States was born in Buffalo, New York. A small company known as the Buffalo Malleable Iron Works poured the first crucible steel castings for the industry's first and still largest customer—the railroads.

Although its history of achievement reaches to the days before the Civil War, the steel foundry industry is still in its youth . . . still growing . . . still proving exciting and challenging to the men who have made it—and keep it—a vital segment of our highly mechanized economy.

From 1861 to 1883 the art of steel casting in this country made little progress. In the latter year, less than 1,700 tons were produced. In 1885, six foundries were in operation, producing 10,000 tons of castings yearly. At the beginning of the twentieth century the number of foundries had increased to 85, with an annual output of 177,000 tons.

Today, the steel casting industry is comprised of approximately 240 commercial foundries, employing more than 50,000 persons, and capable of producing at the rate of nearly 2,500,000 tons per year.

Perhaps the most important factor in the mushroom growth of the steel casting industry was the introduction of the electric arc furnace. This giant step came in 1910, when an experimental 300-pound-capacity electric furnace in the Sharon plant of National Castings Company was used to melt the first foundry steel produced in a furnace of this type.

In this history-making year for the steel casting industry in the United States, National Carbon Company, Division of Union Carbide Corporation, proudly salutes the industry's first one hundred years of progress, the observance of which is being directed by the Steel Founders' Society of America. National Carbon Company, for many of its 75 years of business life, has been privileged to contribute to the growth of the foundry industry—through constantly developing new and better carbon and graphite products.

As the foundry industry moves into its second century, National Carbon pledges its skills and resources to help it achieve higher and higher levels of efficiency in furnace output and plant operations.

Data on the early history of the steel casting industry provided through the courtesy of Wilson H. Moriarty, First Vice-President, National Castings Company, and 1960-1961 President of the Steel Founders' Society of America.

dries Move Ahead

Arc Furnaces

The making of steel entered the era of "push-button," precision-controlled production half a century ago when the electric furnace moved into the scene. Since then it has opened many new ideas, concepts, and methods . . . new horizons in progress . . . for large and small foundries.

Electric melting has made it possible for foundries to produce metals in variety to meet specific needs . . . has raised the control of metal analysis to an exact science . . . has provided melting flexibility that can be speedily adjusted to coincide with molding capacity.

Recently, the editor visited six foundries in five states from coast to coast. In-plant studies made at each of these widely separated locations clearly indicate the importance of electric arc furnaces to the forward-moving growth pattern of the steel casting industry.

The physical limitations of this issue prevent coverage of all the foundries throughout the country using electric arc furnaces today. The following six stories are typical of operations in foundry after foundry that make up this progressive industry.

FIRST TO USE THE ELECTRIC FURNACE IN THE STEEL FOUNDRY INDUSTRY

National Castings Company
Cleveland, Ohio
Sharon, Pennsylvania, Works

National Castings Company began its corporate history in 1868. This year, the name of the organization was changed from National Malleable and Steel Castings Company to National Castings Company to reflect more accurately the nature of its business.

A Pioneer in Electric Melting

In 1910, Sharon installed an experimental electric furnace with a capacity of about 300 pounds. In the years 1912 and 1913 two 11-ft. shell electric furnaces were installed. These units were used successfully for a number of years. They are still in existence, and with proper renovation could be brought back to the production line. Although lacking in the refinements of today's multi-ton electrics, these early furnaces served to prove to management that the trend to future foundry practices would necessitate the speed, flexibility, and precision metal control inherent in the electric arc furnace.

Five New Electrics Installed

In 1951, the last of Sharon's open hearths was replaced by its fifth new electric arc furnace. All five of these units are acid-lined, ten-ton capacity, top-charged furnaces. Each utilizes a 3000 KVA transformer and operates with secondary voltages of 245 on A tap, 190 on B tap, and 110 on C tap.

During 1960, and the first half of 1961, heat times averaged 2 hours and 17 minutes, tap to tap. Recently, oxygen has been used during refining to drop carbon content of the heat from 0.38 to an average of 0.17 at the time of tap.

"These electric furnaces are important, but what we do with them is more important," says Robert Everett, Plant Manager, Sharon Works. "We are pleased with our electric furnaces, because we find them to be the most flexible and fastest steel-producing tool for a foundry of our size. They provide substantial cost-saving advantages over other types of melting equipment."

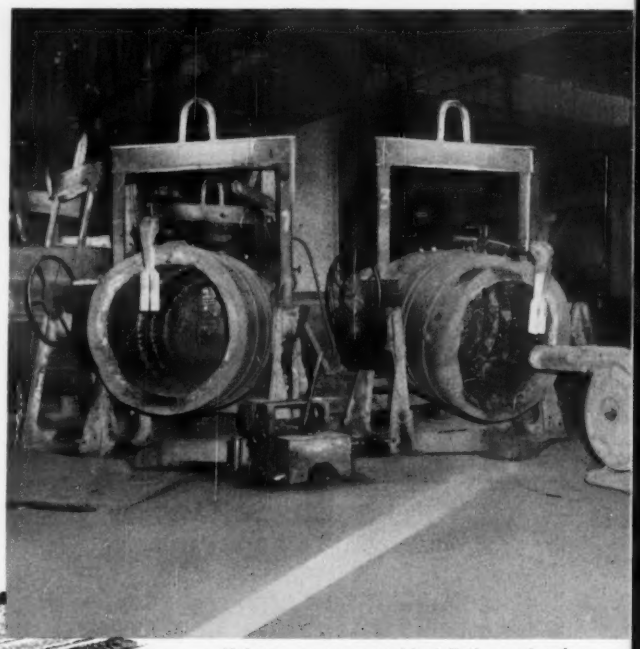
Complete Quality Control

Sharon Works initiated an extensive quality control program 15 years ago. Since then this program has been expanded to cover the charting of approximately 100 separate factors affecting foundry practices. Included are factors such as: control of chemical analyses of heats, physical properties of castings produced, power consumption per ton of steel, heat times, casting dimensions and weights, and sand control.

For example, Sharon has electrode consumption data compiled on a day-by-day basis covering the ten-year period from 1950 to 1960. As shown by the table, electrode consumption per ton of steel has dropped from a high of 11 plus pounds per ton in 1952 to a low of 8½ plus pounds per ton in 1960. Some of the major reasons for lowering of electrode consumption are: general improvement of electrode quality, better maintenance of electrode holders, cleaner joining techniques, and improved over-all efficiency throughout the melting department.

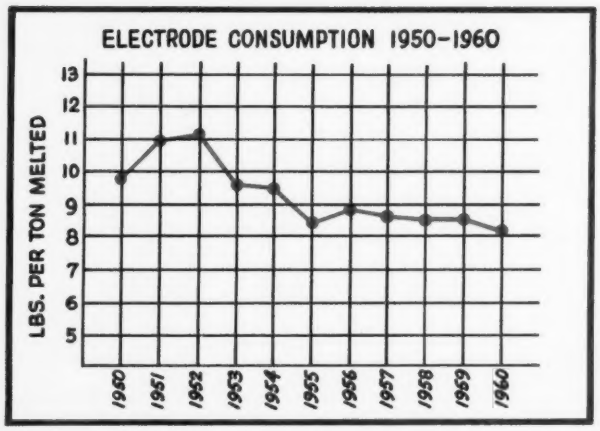
Also, chemical analyses on heats are held to exacting tolerances and recorded daily on charts in the quality control room. Data covering carbon, manganese, silicon, and sulfur are meticulously plotted for each heat and held to strict limitations. The slightest deviation from normal melting practices is spotted immediately and promptly corrected.

In addition to the across-the-board quality control program maintained by Sharon, various inspection tools are used to minimize casting flaws. One such tool is a million-volt x-ray machine with a maximum depth penetration of five inches. Magnetic particle inspection exposes defects up to ¼-inch below the surface.



Unique merry-go-round installation makes for efficient and orderly preparation of ladles.

Oxygen is used at time of tap to drop carbon content of the heat.



Electrode consumption data compiled on a day-by-day basis covering a ten-year period.

As a result of its highly coordinated melting efficiency, mechanized foundry practices, and continuing precision quality control, Sharon Works of National Castings Company in 1960 achieved the lowest ratio in its history of man-hours per ton of castings produced.

OXYGEN-GAS BURNERS INCREASE ELECTRIC FURNACE PRODUCTION

Oklahoma Steel Castings Company
Tulsa, Oklahoma

Since its establishment in 1922, Oklahoma Steel Castings Company has steadily grown in size. This firm manufactures an extensive line of quality products for the aeronautical, agricultural, automotive, railroad, pipeline, mining, refining, steel, power, and bridge and highway construction industries.

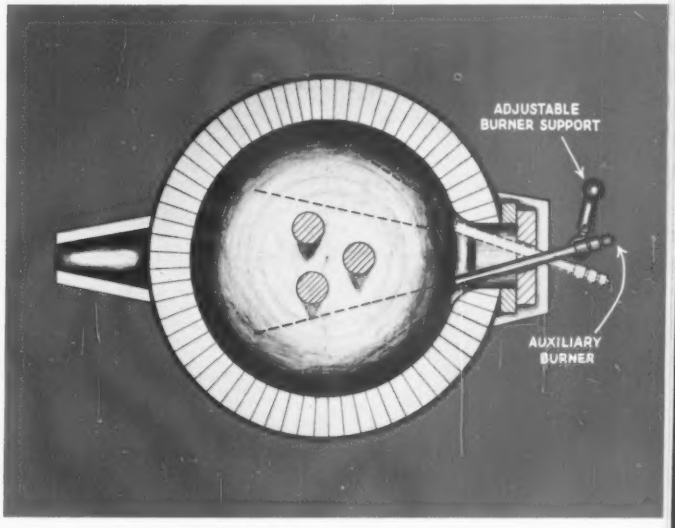
Electric Furnace Production Boosted

In June, 1959, Oklahoma Steel initiated a study of the advantages in using oxygen fuel gas burners through the door of a 4-ton, acid-lined, top-charge electric furnace during melt-down. First trials indicated that this technique would provide an economical increase in production whenever required by increased molding demand. Analysis of test results proved conclusively that output could be expanded without affecting product quality. This was the benefit Oklahoma Steel was searching for in its Tulsa foundry.

Burner Employed Full Time

Within a short time after the testing period, an oxygen-gas burner was employed on all heats except the first heat of the day. This plan was continued until the full economy of the operation could be determined. After a brief period the operators' techniques improved with practice and reflected even shorter heat cycles than those experienced during the initial tryouts. Here are some of the advantages Oklahoma Steel realized from the application of the burner to their melting practices:

SHORTER HEAT CYCLES: Production increased from 113.75 pounds per minute to 131.17 pounds per minute, a gain of 17.42 pounds, or 15.3 per cent. The decrease in melt-down time resulted from added heat, elimination of scrap bridges, and a more stable arc. Cold spots in the furnace can be heated with the burner, and light scrap can be cut from the sidewalls. A principal advantage at Oklahoma Steel is that melting capacity can be increased without any capital expenditure.



Typical door burner installation for furnaces having a capacity under ten tons.

LOWER REFRACTORY COSTS: Refractory costs were reduced by 15 per cent. KWH consumption was decreased by 57 KWH per ton. Electrode consumption remained normal.

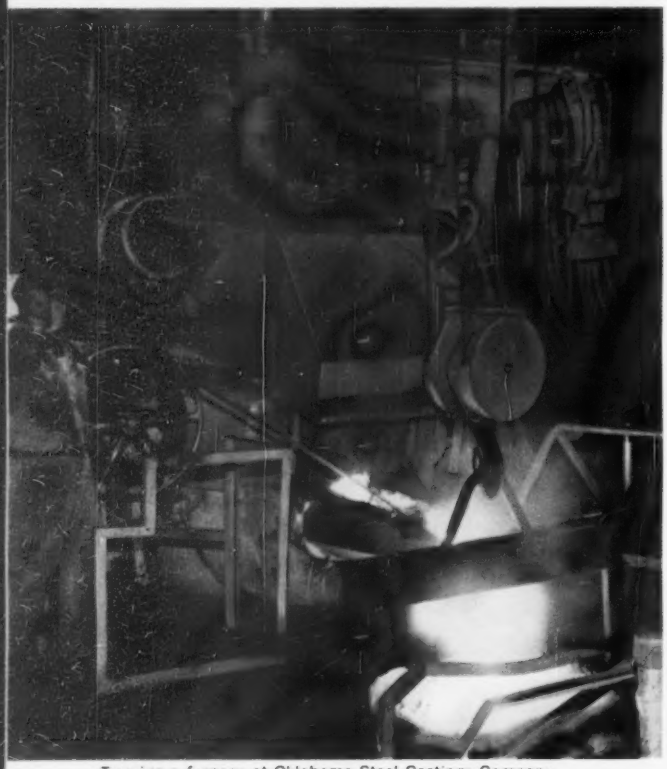
Using the oxygen-natural gas burner through furnace door.

LOWER PLANT COSTS: An average saving of 10 man-hours per ton of steel was reflected in plant costs. Molding time per ton of steel was lowered and overtime was eliminated in many instances.

OXYGEN CONSUMPTION: Average oxygen consumption was 600 cubic feet per ton, while average natural gas consumption was 400 cubic feet per ton.

The Tempo of The Plant

Oklahoma Steel management states that, "these modern melting facilities—the electric furnace teamed with oxygen-natural gas burners—are the backbone of Oklahoma Steel's foundry operations. They permit melting of a wide range of analyses on short order, and allow economical adjustment of melting capacity to molding capacity. The flexibility of the equipment was effectively demonstrated when it recently produced 25 heats from one furnace in a 24-hour day."



Tapping a furnace at Oklahoma Steel Castings Company.

An interesting factor concerning the installation of the oxygen-gas burner was the matter of plant safety. Despite the fact that Oklahoma Steel's personnel had to adjust to new techniques of operation, the company's unusual and impressive safety record was not blemished during the training period. This record—over 1,000,000 man-hours without a lost-time accident—is the best score reported to the Steel Founders' Society of America for any foundry in the country.

1% CARBON STEEL ROUND-THE-CLOCK WITH ELECTRIC FURNACES

American Brake Shoe Company
Calera, Alabama

To produce "Southern" Cast Steel Wheels in volume—and to obtain high quality at low cost—American Brake Shoe installed electric furnaces at their Railroad Products Division plant in Calera, Alabama.

This plant closely approaches the ideal straight-line, continuous-flow foundry principles. All possible operations are mechanized. Power-operated equipment and push-button control have made possible an increase in production of 1 per cent carbon cast steel wheels from 37 per day in 1954 to 540 wheels per day in 1961.

Electrics Play a Vital Role

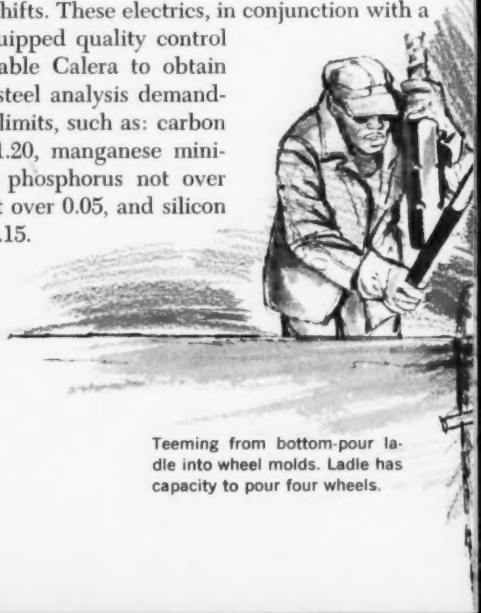
Melting capacity at Calera consists of four 9-foot, top-charge, basic electrics, utilizing transformers rated at 3500 to 4000 KVA. Three of these furnaces operate around-the-clock, with heat times averaging 1 hour and 45 minutes per furnace, tap to tap. A fourth furnace is held on stand-by for use during maintenance and relining periods.

Electric arc furnaces play a vital role at Calera by permitting the production of steel which must be held to analysis of pinpoint accuracy. These furnaces are readily adjustable to meet the requirements of modern, high-speed, foundry conditions.

"Electric arc furnaces," in the opinion of Steve Davis, Plant Manager at Calera, "are the only melting tool that can offer us maximum flexibility of production and still maintain on-the-nose metal analysis. They turn out steel according to demand and can be operated on any number of shifts and for any number of days per week."

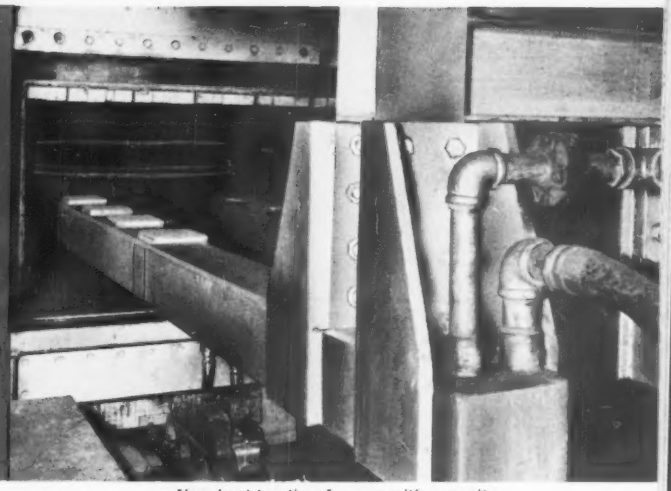
High-Carbon Steel Produced

More than 250 tons of 1 per cent carbon steel are produced in three electric furnaces operating on an 18-hour basis, or two 9-hour shifts. These electrics, in conjunction with a completely equipped quality control laboratory, enable Calera to obtain uniformity of steel analysis demanding very close limits, such as: carbon from 0.95 to 1.20, manganese minimum of 0.50, phosphorus not over 0.05, sulfur not over 0.05, and silicon not less than 0.15.



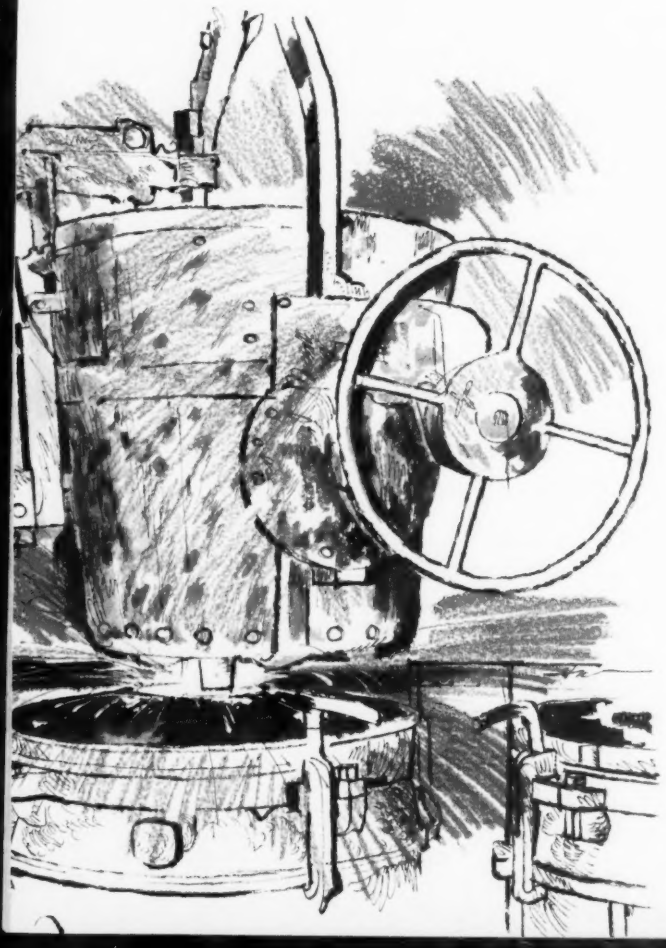
Teeming from bottom-pour ladle into wheel molds. Ladle has capacity to pour four wheels.

Melt floor at Calera showing line-up of four 9-foot, top-charge, basic electrics.



New heat-treating furnace with capacity to handle 600 wheels per 24-hour day.

Steel is tapped from the electrics into a teapot ladle where alloying additions are made, preferably, at a temperature of 3,000°F. This ladle is placed on the pouring stand where sufficient metal to pour four wheels is transferred to a bottom-pour ladle and teemed into the wheel molds. The heat of the metal is checked on the first, third, and last pour to assure that the temperature does not drop below 2,770°F.



Plant Capacity Expanded

In July, 1961, the Calera plant completed a major expansion program. Heat-treating facilities were upgraded to handle a maximum of 600 wheels per 24-hour day. Other areas of the foundry were modernized to permit utilization of approximately 25 per cent more electric furnace steel.

In the near future a 670,000 s.c.f. at atmospheric-pressure liquid oxygen storage unit will be built at Calera. Oxygen is presently being used to reduce carbon during refining. Experiments have been conducted using oxygen door lances to speed heat times during melt-down. "These experiments," according to E. A. 'Red' Bacher, melting foreman, "have shown us that we can reduce melt time as much as from fifteen to twenty minutes per heat."

In 1962, American Brake Shoe plans to expand its total steel casting production by converting its cast iron wheel plants in St. Louis, Missouri, and Toledo, Ohio, to cast steel wheel plants similar to the Calera operation. A top-charge electric furnace with a 10-ft. shell diameter will be installed in both foundries to provide the same flexibility and dependability of melting operations long associated with Calera.

ELECTRICS REPLACE OPEN HEARTHS IN MODERNIZATION PROGRAM

Birdsboro Corporation
Birdsboro, Pennsylvania

Birdsboro Corporation, dating back to 1740, began as an iron forge in the municipality of Birdsboro, Pa.

Conversion to Electrics

Installation of three electric furnaces—key elements in a recent modernization and expansion program—gives Birds-

boro outstanding metal production flexibility. The foundry can melt up to 300 tons of high quality steel a day. Where production was limited previously to carbon and low-alloy steels, the range of products that can be cast now includes stainless and high-alloy steels for use in high-pressure, high-temperature, and corrosion-resistant applications.

Before the full conversion to electric furnace melting the foundry could melt nothing smaller than an 8-ton heat. Today, it can produce a minimum melt of 4 tons, which means that smaller orders can be handled, heats scheduled more efficiently, and deliveries improved.

New electric furnace having a shell diameter of 13½ ft. and a melting rate of 7 tons per hour.

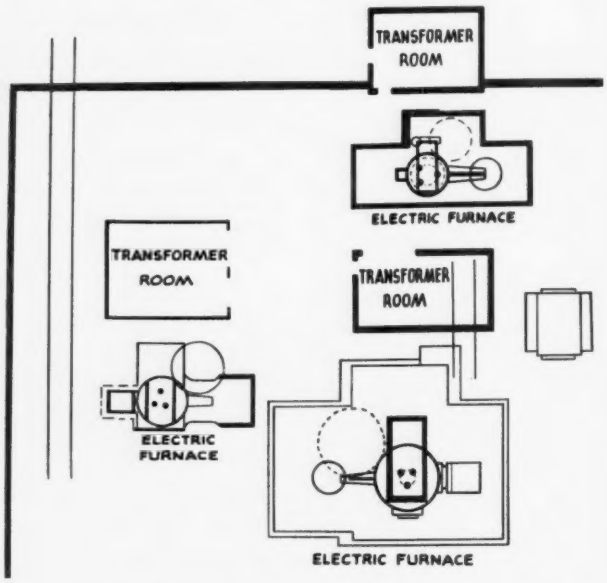
Increased Melting Capacity

Birdsboro's first electric furnace has been in continuous operation since January, 1955. This unit, with an 11-ft. shell diameter, handles an average heat of 15 tons at a melting rate of 5 tons per hour.

Both of the new furnaces, installed late in 1960, slightly overlap the melting range of the older furnace but provide smaller and larger capacities. The smaller furnace has an 8-ft. shell diameter and handles an average heat of 5 tons at a melting rate of about 2 tons per hour. The larger of the new furnaces has a 13½-ft. shell diameter and a melting rate of 7 tons per hour.

With the three electric furnaces in operation, Birdsboro can cast parts ranging in size from 50 to 80,000 lbs. The foundry has a 50-ton crane capacity and can produce castings weighing as much as 100,000 lbs., depending on design and linear requirements.

Steel chemistry is vastly improved by basic electric melting practices. Sulfur and phosphorus content in the heat is consistently below 0.020%. Carbon is removed from the melt with gaseous oxygen to improve quality and speed up refining. In all, the basic electric furnace is a faster melting tool and provides steel of a much higher, consistent quality than the earlier acid open hearth furnaces.



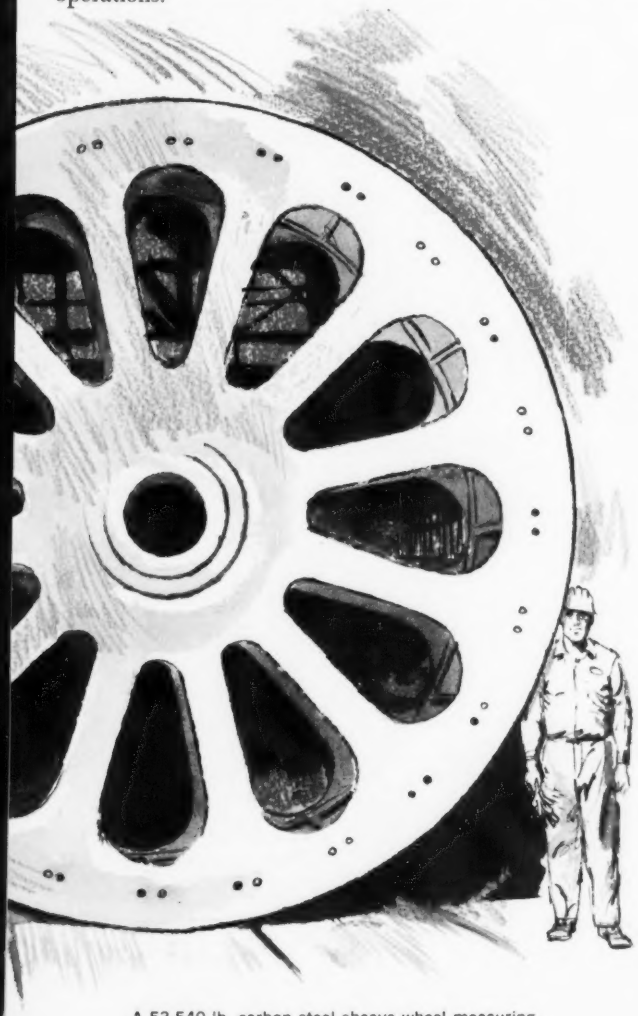
Melt floor area of modernized and expanded Birdsboro foundry.

According to Birdsboro President G. Clymer Brooke, foundries will have to produce quality steel castings if they are to remain competitive. The demand and need for electric steel castings is rising rapidly with no decline in prospect, he points out. High-alloy and stainless steel castings of extra high quality are needed for many modern applications where nothing less than the best will do the job.

"I would estimate that 25% of our current casting tonnage is business we have only because we are equipped with electric furnaces," Mr. Brooke observed. "There are many jobs on which we could not even quote if we did not have these units."

Advantages of Electrics

In a detailed study comparing costs of basic electric melting with acid open hearth melting over a five-year period, Birdsboro found that both the conversion cost and total cost per ton were progressively less for electric furnace operations.



A 53,540 lb. carbon steel sheave wheel measuring 15 ft. 1¾ inches cast by Birdsboro Corporation.

The recent installation of the second and third electric arc furnaces has completely eliminated three open hearth furnaces—two of 30-ton capacity and one of 20 tons.

Electrode consumption with the electrics has been good —9½ lbs. of graphite per ton of steel produced. When the electric furnaces are not in full production, the available capacity can be devoted to casting ingots. Production is more flexible, sales possibilities increased, and casting quality improved.

OVER 100 ALLOY STEELS PRODUCED WITH VERSATILE ELECTRICS

Esco Corporation
Portland, Oregon

Esco Corporation started in the foundy industry in 1913 under its original name of Electric Steel Foundry Company.

Today, Esco is a producer of a wide variety of alloy and stainless steel castings and other product lines for a multitude of industries.

In this modern foundry, three types of casting facilities are available: green and dry sand molding, shell molding, and centrifugal molding.

The numerous fields it serves are handled by seven basic divisions: Casting Sales, Construction Equipment, Logging, Sawmill, Crushing Equipment, Process Equipment, and Stainless Cast Specialties.

Esco's Electric Capacity

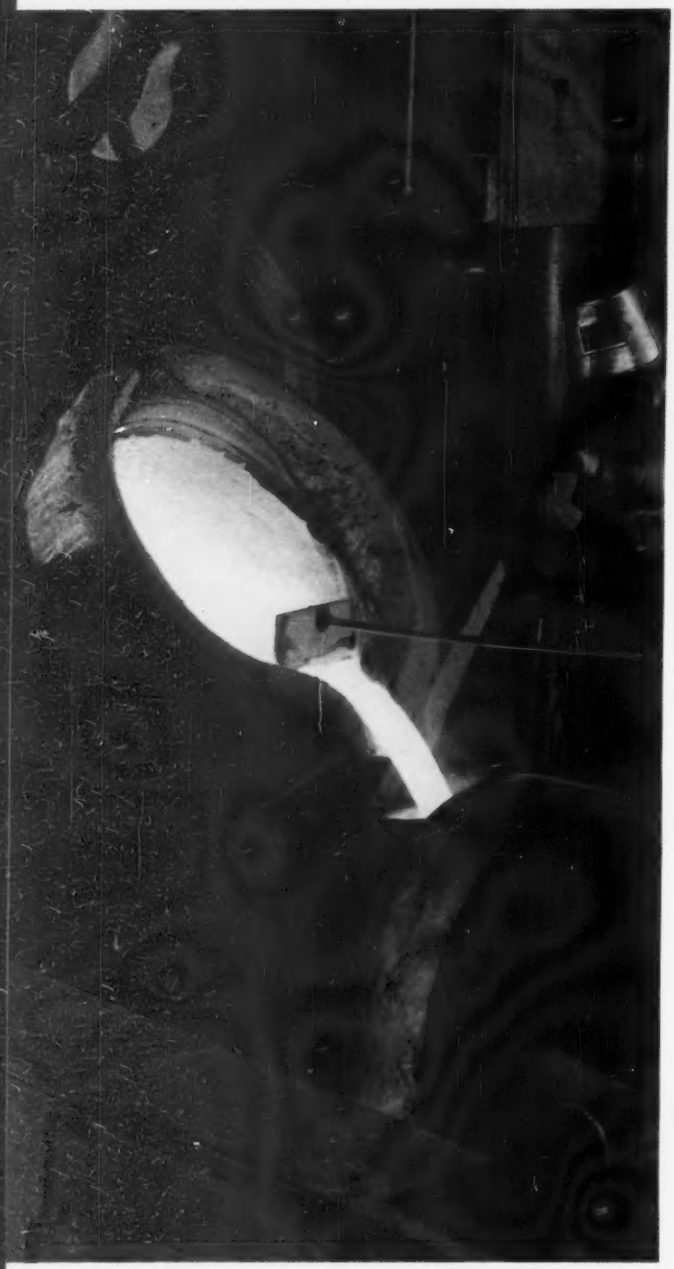
From its early installation of an electric furnace nearly half-a-century ago—when electric melting was a new and revolutionary process—Esco's melt floor has been modernized and expanded over the years to accommodate five basic-lined, top-charge electrics. More than 100 alloy analyses are produced in two 1-ton, two 3-ton, and one 4-ton furnaces. These units are powered by transformers ranging in size up to 3125 KVA.

"Considering the quantity and diversity of alloys we melt, and the quality of our products—plus a finished casting range from a few ounces to 20,000 pounds—no other melting equipment can match the exacting control and the flexibility of operations available with electric furnaces," according to L. E. Fink, Esco's Supervising Metallurgist-Operations.

Tapping an electric furnace at the Esco Foundry in Portland, Oregon.

Melting Practice

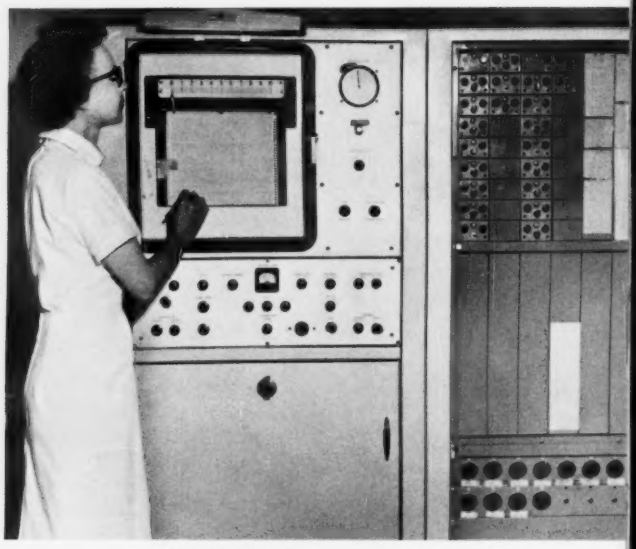
A typical heat cycle in an Esco electric furnace runs as follows: charge to melt-down, approximately 55 minutes; oxygen blow and refining time, roughly 25 minutes; tap and recharge time, an average of 5 minutes. One hour and 15 minutes is the average heat time for all furnaces, tap to tap. Alloy additives are made during refining and deoxidizers are introduced in the ladle.



Pouring molten metal from the large transfer ladle into the pouring cup of a centrifugal casting machine.

How Quality is Assured

Esco has joined the steel casting industry in the adoption of every applicable and successful method of analysis and testing, to assure products that meet the most stringent demands of customer industries. To achieve this goal, Esco utilizes magnetic particle testing, fluorescent penetrant inspection, spectroscopy and tensile and pressure testing methods. In addition, this foundry has recently installed its own Betatron, a 24-million electron volt X-ray machine, which is used to "see through" 2-inch to 20-inch metal sections in a matter of minutes.



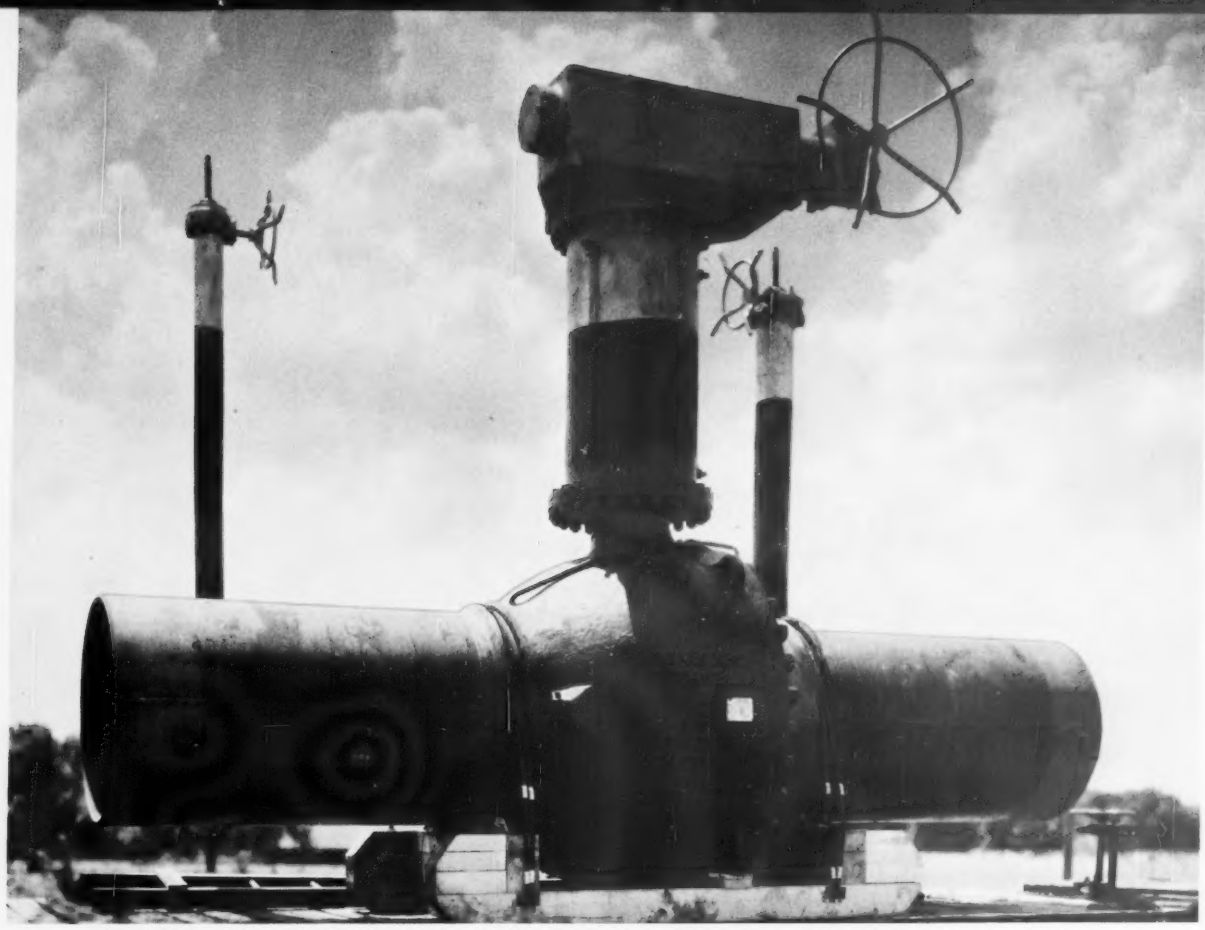
Direct Reading Spectrograph gives a rapid chemical analysis before and after pouring.

Through these up-to-the-minute techniques in melting, casting, and testing, Esco Corporation has found the way to continually multiply the quantity and quality of its alloy steel castings.

RANGE OF FURNACE SIZES AIDS PRODUCTION SCHEDULING

The LFM Manufacturing Company, Inc.
Atchison, Kansas
Subsidiary of
Rockwell Manufacturing Co.
Pittsburgh, Pa.

LFM was founded in 1872. In 1956 the company merged with Rockwell Manufacturing Company and changed its name to The LFM Manufacturing Company, Inc.—a change that only made official a designation by which the firm had been widely known for many years.



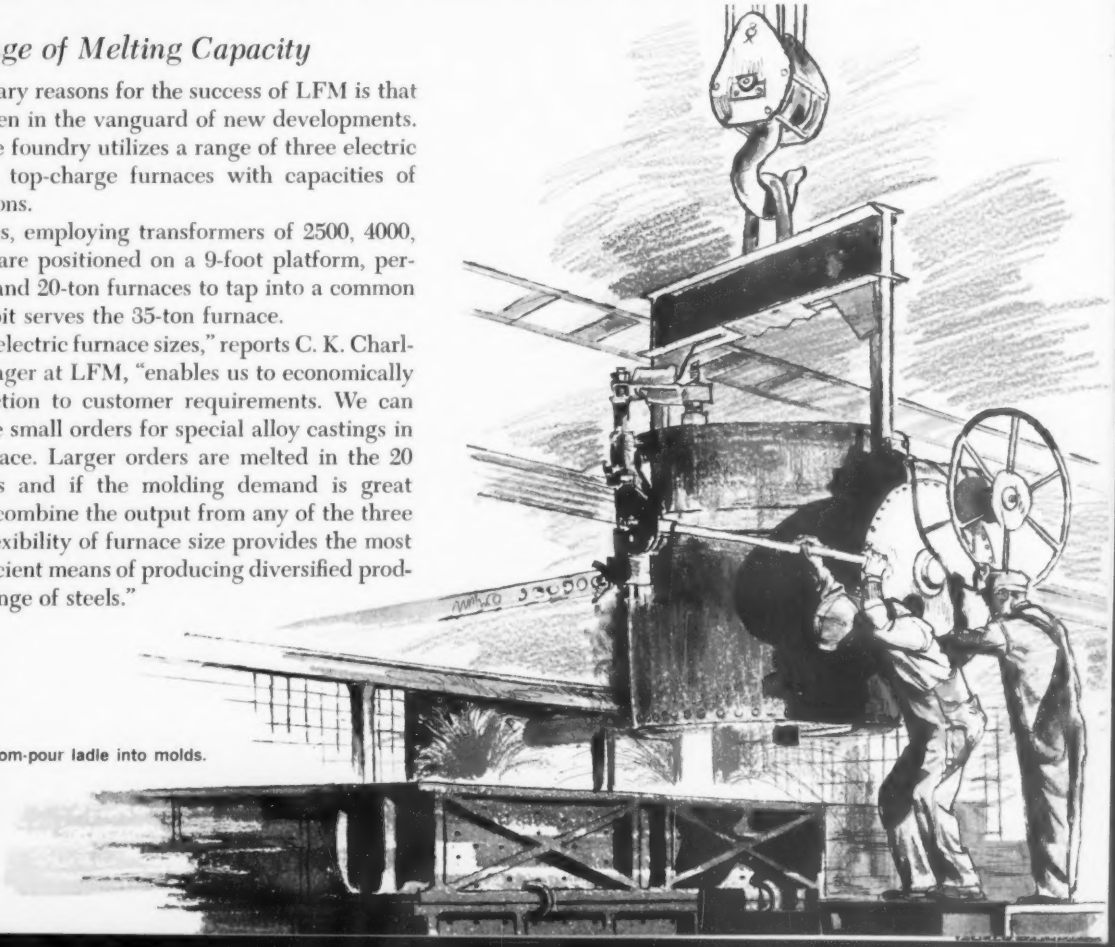
A 36" Rockwell Hypresphere cast steel valve with extended Rockwell valve actuator ready for shipment from the LFM plant.

Range of Melting Capacity

One of the primary reasons for the success of LFM is that it has always been in the vanguard of new developments. For example, the foundry utilizes a range of three electric arc, basic-lined, top-charge furnaces with capacities of 7½, 20, and 35 tons.

These furnaces, employing transformers of 2500, 4000, and 7500 KVA, are positioned on a 9-foot platform, permitting the 7½ and 20-ton furnaces to tap into a common pit. A separate pit serves the 35-ton furnace.

"Our range of electric furnace sizes," reports C. K. Charlton, Works Manager at LFM, "enables us to economically gear our production to customer requirements. We can efficiently handle small orders for special alloy castings in the 7½-ton furnace. Larger orders are melted in the 20 and 35-ton units and if the molding demand is great enough, we can combine the output from any of the three furnaces. This flexibility of furnace size provides the most practical and efficient means of producing diversified products of a wide range of steels."



Teeming from a bottom-pour ladle into molds.

View of furnace floor at LFM showing range of electrics with capacities of 7½, 20 and 35-tons.

Melting Practices at LFM

A typical operating cycle on any one of the furnaces would consist of a 2 or 2 hour and 15 minutes melt-down and oxidation period followed by 30 to 45 minutes "finishing" time. The oxidation is accomplished by the use of an oxygen lance through the door. Chemistry of the melt is checked by spectroscopy three times during the heat. Silicon and aluminum are added in the ladle.

Tap to tap heat times on the three furnaces average 3 hours, while electrode consumption averages 10.8 lbs/ton of steel produced in all furnaces.

Approximately 75 per cent of the metal cast at LFM is carbon steel produced to an analysis specification of 0.65-0.80 Mn, 0.35-0.50 Si, 0.20-0.26 C, 0.05 max P, and 0.05 max S. The alloy steels poured include nickel, chromium-molybdenum, manganese-molybdenum, and nickel-vanadium.

Facilities Recently Expanded

A few years ago, LFM invested approximately $3,000,000 in the expansion of its foundry facilities. The foundry working area was increased from 200,000 to 300,000 square feet and production capacity was raised from 2000 to 3000 tons of finished castings per month.

This program included new buildings for melting and scrap storage, a new 35-ton furnace and accessory equipment, heat-treating facilities, molding machines, cranes, conveyors, and an enlarged sand reclamation and distribution system.

Today, with flexible electric furnaces, plus modern casting and machine shop facilities, LFM produces a broad line of quality castings that range in weight from 100 to 35,000 pounds. The foundry is capable of shipping more than 3000 tons of steel per month, making it one of the largest electric steel foundries under one roof.

Summary

If the technical advances and operating efficiency encountered in the six foundries visited by the editor are characteristic of the nation's other commercial steel foundries, then there is no doubt that this great industry is destined to establish new records in progress during the Space-Age Sixties!

Growth of the industry is constantly being sparked by a never-ending stream of new ideas in foundry practice . . . melting equipment is becoming increasingly more productive . . . better and more reliable methods of analysis and testing are helping to upgrade quality and expand the quantity of steel castings produced today.

No small part of the credit for the forward surge of America's steel casting industry in recent decades is shared by the electric arc furnace. Since its first use by the industry in 1910, this precise melting equipment has offered progressive foundries a dependable means of controlling the metal they produce. It also has enabled them to employ this production to meet exacting foundry schedules.

In foundry after foundry—across the country—new melting techniques are continually being brought into play. Oxygen, as one outstanding example, is being utilized today in some foundries to produce even higher electric furnace efficiencies, with resultant lower operating costs.

In looking across the long and successful history of the steel casting industry, it is predicted that our country's steel foundries—with the assistance of modern electric arc furnaces—will continue to enhance their productiveness and value to their customers at an ever-increasing rate.

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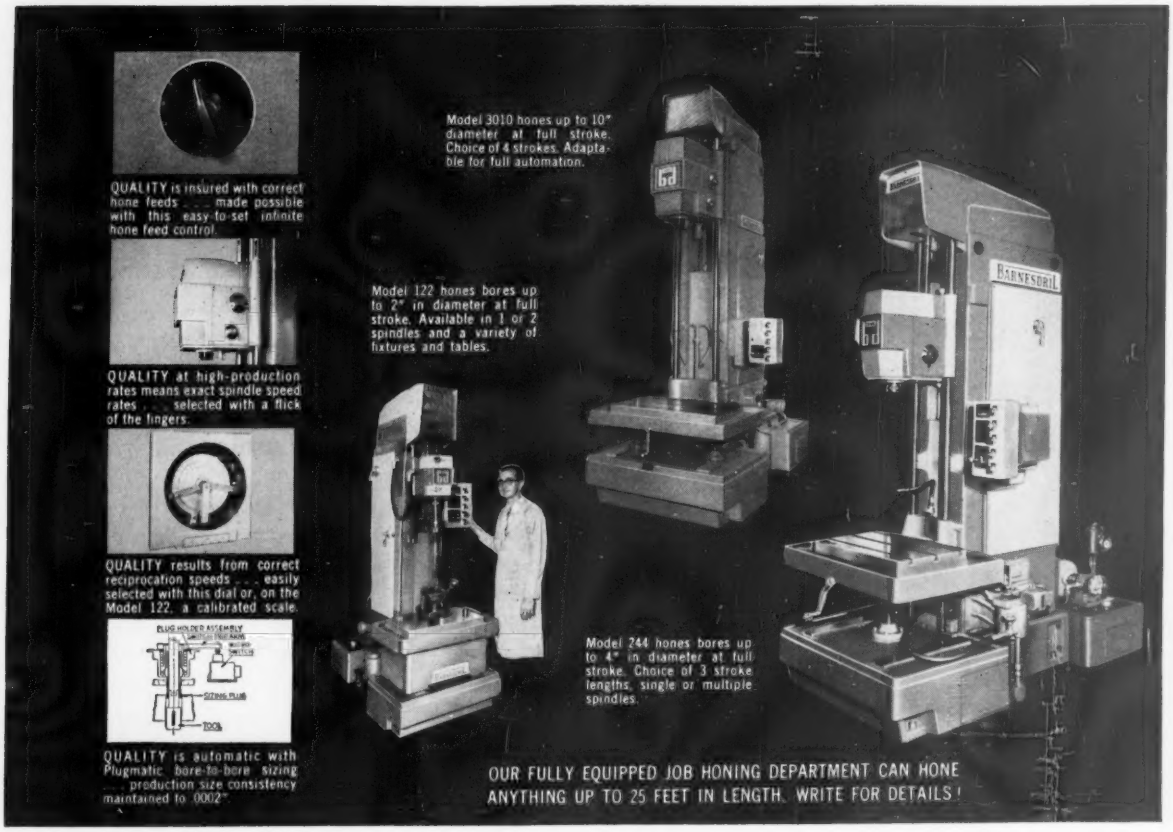
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100% tape commanded by G. E. Mark Century control—*all* operator controls at the console—solid state components (no tubes, stepping switches or rotating parts)—temperature and humidity controlled—built-in computer for linear and circular interpolation.

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Ask to have a LeBlond engineer stop and talk Tape-Turn, the machine on the floor instead of the drawing board. Or write for our new descriptive bulletin TT-1061 B.

LeBLOND of Cincinnati

The R. K. LeBlond Machine Tool Company, Cincinnati 8, Ohio

Leading the way in numerically-controlled turning.

Lesson from Europe

In Europe, the businessman's advice is not only sought but is demanded by his government. The counsel of industrialists shows up in government policies and actions. The businessman is looked up to almost universally.

Those are some of the observations which were made by F. Kermit Donaldson, executive vice president of the Steel Founders Society of America and president of the American Society of Association Executives, when he was on an industry study mission in Western Europe.

Mr. Donaldson's observations are similar to those made by other businessmen who have traveled overseas.

They might well be pondered soberly by members of our government.

We suspect that the attitude of European governments toward industry may be substantial contributing factors to:

- The general boom and rapid economic growth in Europe.
- The relatively full employment. In West Germany, for example, unemployment is less than 1 per cent, and there are six jobs for every available worker.
- The fast modernization of European industry. All countries of Europe (and industrialized nations all over the world) have more liberal and more modern depreciation policies than the U. S. Investment in efficient, modern equipment has been encouraged.
- The better co-operation between European industry and labor to keep costs competitive. European workers want higher wages. They get advances. But labor, government, and industry consider the effect of such wage increases on competitive costs.
- The better support European countries give their industries in selling their products in the world market—through assistance in extending long term credit, through more aggressive promotion, and through the creation of a generally favorable climate for trade.
- The promotion of a better exchange of information and more intelligent co-operation among industries—co-operation that would not be permitted in this country.

Postwar Europe and other countries have learned many lessons from us. Particularly, they have learned that a strong and efficient industry promotes national strength and higher standards of living.

Is it not time that our government learn a few lessons from them?

Walter J. Campbell

EDITOR

4-piece assembly replaced by one aluminum extrusion

Hundreds of manufacturers have taken a fresh look at their products. In doing so, they have discovered that extrusions like the one shown can now cut down on hand labor and replace costlier assemblies . . . or replace rolled, crimped, welded or machined parts.

Production techniques and aluminum alloys have improved rapidly. So it takes a specialist—an experienced independent extruder—to keep you up to date with all the cost-saving possibilities that extrusions now offer. To be sure you're taking advantage of possible cost savings, have a nearby extrusion specialist analyze your product line promptly.

It's good business to know one of these independent extruders . . . specialists who are supplied with top-quality aluminum ingot by Aluminium Limited.

...and then there was one:

MAIL THIS COUPON FOR EXTRUDER NAMES AND ADDRESSES.

Aluminium Limited Sales, Inc., Dept. ST-12
111 W. 50th St., New York 20, N. Y.

Please send me a list of Independent Extruders in this area.

Name_____

Title_____

Company_____

Address_____

City_____ State_____

ALCAN

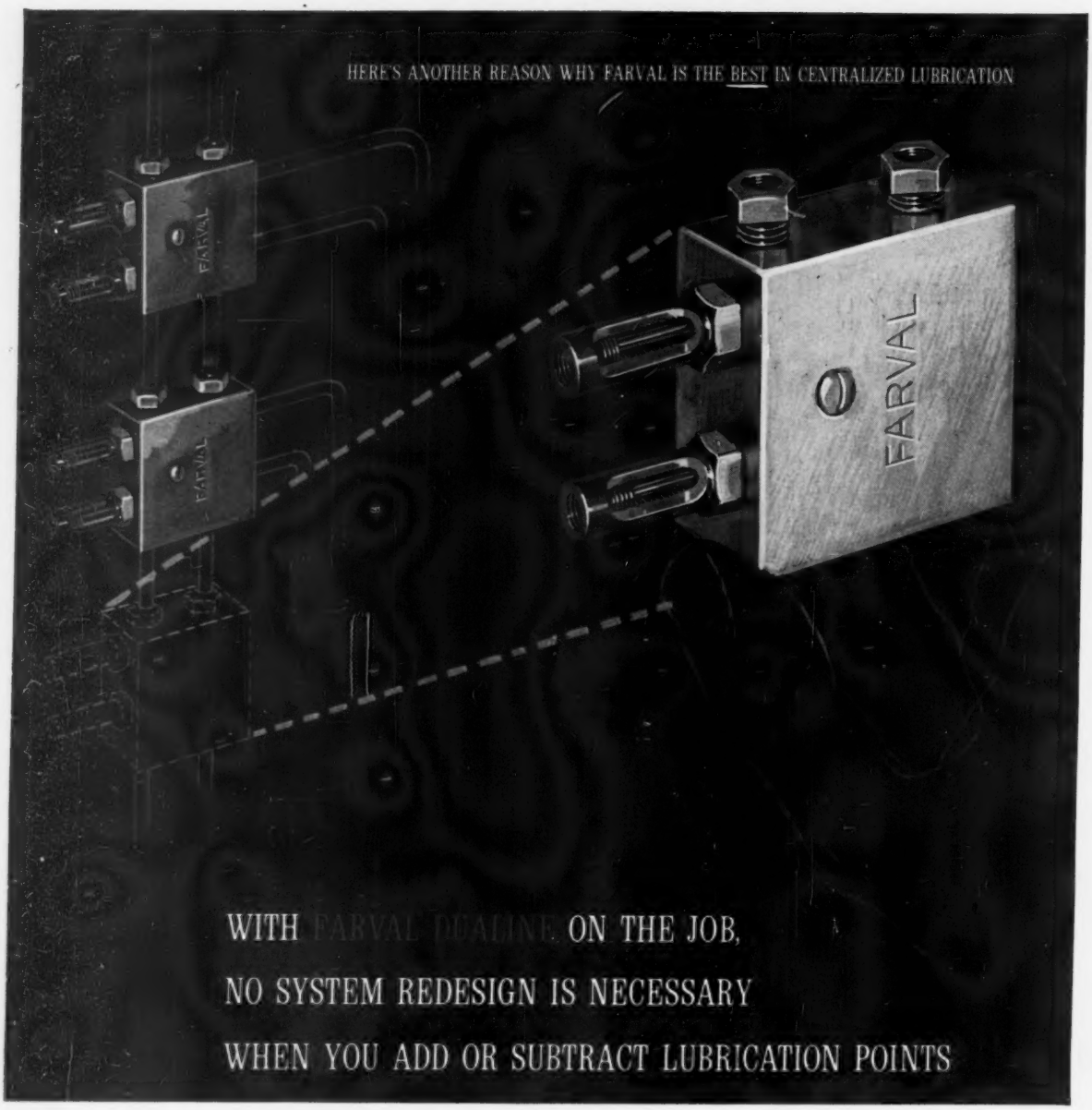
Supplying metal and ideas to companies that work with aluminum

ALUMINIUM LIMITED

Aluminium Limited Sales Inc., 111 W. 50th St., New York 20, N. Y.

The rolled section in the top illustration is in four parts with several fasteners and two welds. It was replaced by the single aluminum extrusion below with great savings in time and labor.

HERE'S ANOTHER REASON WHY FARVAL IS THE BEST IN CENTRALIZED LUBRICATION



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NO SYSTEM REDESIGN IS NECESSARY
WHEN YOU ADD OR SUBTRACT LUBRICATION POINTS

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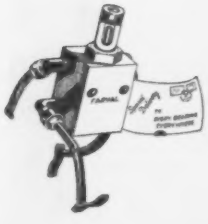

Farval Division
Eaton Manufacturing Company
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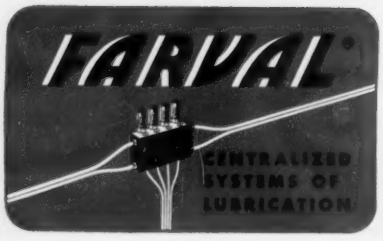


Layoffs May Cost You More in '62

Unemployment Compensation Taxes Will Rise in Seven States

States	1961 Rate (As percentage of salary or wages†) Min	Max	1962 Rate (Est) Min	Max	Legal Max	Average Rate—Metalworkers
Ohio	0.1%	2.7%	0.6%	3.2%	3.2%	1.88%
California	0.3	3.0	2.2	3.5	3.5	2.1
New York	1.5	3.5	2.1	3.9	4.2	3.15
Massachusetts	1.0	2.7	1.1	3.9	4.1	2.03
Missouri	0	3.6	0	3.9	3.9	1.4*
Minnesota	0.3	2.7	0.6	3.0	3.0	1.3
Alabama	0.5	2.7	0.5	3.6	3.6	1.7
Pennsylvania	2.0	4.0	2.0	4.0	4.0	3.2*
Illinois	0.1	4.0	0.1	4.0	4.0	2.66
Michigan	1.0	4.5	1.0	4.5	4.5	3.47
New Jersey	0.7	3.9	0.7	3.9	4.2	2.32
Indiana	0.1	2.7	0.1	2.7	2.7	1.1
Connecticut	1.5	2.7	1.5	2.7	2.7	2.1*
Wisconsin	0	4.0	0	3.6	4.0	1.5*
Texas	0.1	2.7	0.1	2.7	none	0.9*
Maryland	1.8	4.2	1.8	4.2	4.2	3.68
Washington	2.7	2.7	2.7	2.7	2.7	2.7
Iowa	0	2.7	0	2.7	2.7	0.38*
Kentucky	0.6	4.0	0.6	4.0	4.2	2.19
Tennessee	0.75	3.5	0.75	3.5	4.0	2.03

Plus 0.8% on 1962 payrolls to federal government for administering national and state employment services and repaying 1961's temporary unemployment compensation advance.

†All states tax the first $3000 salary or wages except California ($3800) and Massachusetts ($3600).

*Rate for all industry.

How to Figure Your Payment:

Wage tax base × U. C. rate (state + federal) = cost per employee per year × number of employees = total unemployment compensation per year

Example: Michigan

$3000 × (4.5% + 0.8%) = $159 × 1000 = $159,000

. . . in fact, the nation's employers will pay an estimated $3.5 billion in unemployment compensation (UC) taxes next year, a half billion dollars over the 1961 figure. Boosts in rate schedules in seven of the 20 top metalworking states (see table) have been necessitated by peak joblessness, liberalized benefits, loosened restrictions, or questionable financial management of state funds over the last three years.

Employers in almost all the other states will probably find themselves contributing more, even if they have relatively low unemployment. Reason: The degree of unemployment in the state, emergency levies, and changes in the method of calculating taxes.

Practically every manager has a stake, directly or indirectly, in those increases. With price competition continuing sharp in many industries in 1962, every additional dollar added to production costs cuts profits.

• **Example**—Take the case of a 1000-man machine shop in Michigan paying the maximum tax. As noted in the example (left), yearly payment into the coffers of the Michigan unemployment compensation fund will be $135,000. Add

$24,000 as the federal government's tax on 1962 payrolls, making a total of $159,000. If the company profit before federal income tax is 10 per cent, it will take $1.6 million in sales in 1962 to cover contributions to the state unemployment compensation fund, federal and state employment service administrative costs, and repayment of the temporary advance in benefits voted by Congress last spring.

Despite the increased take from employers, state funds are said to be in a "critical" condition. Some are dangerously low, or have been saved by emergency levies or federal advances.

One reason for this situation is the "unbusinesslike handling of state funds," says Unemployment Benefit Advisors Inc., Washington, an employer group studying the country's programs. Stanley Rector, its executive director, cites:

- The practice of divvying up interest earned on the huge sums among employer accounts instead of holding it in reserve for contingencies.
- Overdrafts—paying benefits to laid off employees of companies that have already exhausted their payments into the fund and have a "negative fund balance."
- Noncharges—benefits not charged to an employer because they are "beyond his control."

Many employers, particularly those enjoying low rates because of favorable unemployment experience, want to increase the maximum taxes so that the burden of these "socialized" costs is more equitably distributed. Donald B. Shaw, vice president-treasurer of F. L. Heughes & Co. Inc., Rochester, N. Y., for example, urges an increase in the New York tax to secure a top rate "that will force negative balance employers to sit up and take notice."

The Michigan Employers' Unemployment Compensation Bureau spearheaded an attempt this year to boost that state's tax ceiling to 6.6 per cent under certain circumstances, but the measure was vetoed by the governor.

STEEL's survey of companies, chambers of commerce, and employer organizations reveals a basic problem: Ignorance of the law, and worse, indifference to it. But alert companies are taking steps that mitigate the effects of the tax.

- **Stabilize Employment**—Not much can be done when general economic conditions or unexpected contract cancellations cause a cut in work force. But you can do much to eliminate those peaks and valleys in production that come from poor planning.

Thompson Ramo Wooldridge Inc.'s Electromechanical Group, Cleveland, has a program of "sensitizing" supervisors to make them aware of the costs involved in poor production scheduling that results in layoffs.

There are even instances when it might be better to keep a man on the job rather than lay him off for a short time, points out F. A. Khadder, manager of personnel research and planning for the group. His salary may be negligible compared with administrative costs of taking him off the payroll and then rehiring him, combined with unemployment benefits for the period.

An Ohio steelmaker has three mathematicians working full time to determine formulas for least costly use of manpower and other resources.

Many companies schedule overtime or use workers supplied by outside services, rather than hire new people who will be around just long enough to gain unemployment compensation credit.

Firms can work more closely with customers in scheduling orders to avoid cyclical layoffs, suggests Norman Seip, manager of Erie relations and utilities, at General Electric Co.'s heavy apparatus plant, Erie, Pa.

- **Check Claims Thoroughly** — Many companies are negligent about checking claims of former employees until it is too late. One Illinois firm started scrutinizing applications this year for the first time and got 26 claims disallowed for legitimate reasons.

A complete dossier should be kept on all employees dismissed for cause so that your case can be substantiated if it comes to a showdown before the appeals board.

But don't waste your time and the state bureau's by nitpicking claims.

- **Don't Forget SUB** — Remember, employers paying supplemental unemployment benefits (SUB) have a double incentive to cut down layoffs and to make sure that only those persons entitled to UC are registered on the claims rolls. SUB payments are generally based on the same qualifications as unemployment compensation.

- **Merit Ratings Threatened**—Employers with merit ratings — they pay less as a reward for good employment records—are often the only source of added revenue to help

Small Motor Spins 90 Ton Turntable

ANTIFRICTION bearing rollers and a gear ratio of 108,000 to 1 make it possible for a turntable that weighs 90 tons when loaded to be driven by a 1 hp, electric motor (center). The turntable has been fabricated and tested at the Everett (Wash.) plant of Western Gear Corp.'s Heavy Machinery Div. It will support a revolving restaurant at the top of the 600 ft Space Needle at the Century 21 World's Fair, in Seattle.

get state funds out of a hole. In many states, there is only a little spread between the lowest and the maximum rate payable. And legislation is coming up in Congress next session which industry observers feel will in effect eliminate merit rating. The National Association of Manufacturers calls merit rating "the most equitable and efficient way of allocating unemployment compensation costs."

Warns Robert B. Johnson, industrial relations director of American Optical Co., Southbridge, Mass.: "If the merit rating goes, employers will become less concerned about abuses of claims since no savings can accrue to them by being conscientious."

Organized labor disagrees. Nelson H. Cruikshank, director of the AFL-CIO's Department of Social Security, opposes merit ratings because of "the absence of any proof in the last 20 years that merit rating ever resulted in stabilization of employment—instead, it has resulted in a significant role for the employer in administration and claims decisions; and it has encouraged employers to seek changes in the law to exempt claimants in their particular industry."

• **Educate Employees** — Do your people know that unemployment compensation benefits come out of your treasury? Thompson's Electromechanical Group points out to workers how fringe benefits, including UC, influence the cost of doing business in Cleveland, and, in turn, influence their job security. Group officials believe the approach helps cut wilful abuse of the system.

They feel it also makes employees more appreciative of the company's position on cost control.

• **Hire from Jobless Rolls**—Be sure you list job openings with the state employment service so that persons drawing benefits can be taken off the benefit list.

• **What's the Limit?** — Many employers feel the original intent of unemployment compensation has been lost. Harold A. Acker, assistant treasurer of J. L. Clark Mfg. Co., Rockford, Ill., says: "We have to get down to fundamentals: What is the purpose of unemployment compensation?" His question is answered indirectly by several executives queried by STEEL: It should not be considered a dole. Unfortunately, benefits seem to be based on "need," not on wages earned. The relatively small gap between benefit payments and take-home pay continues to close. Idleness is being promoted because "it's almost not worth working for the duration of the benefits."

New Cathode Boosts Aluminum Output

A MODIFIED reduction cell that utilizes new "refractory hard" metal cathodes in the aluminum reduction process has been developed as the result of joint research by Kaiser Aluminum & Chemical Corp. and British Aluminium Co. Ltd.

The two firms consider the development of major commercial significance because it "can substantially reduce the production cost per pound of aluminum and permit expansion of capacity of existing facilities with relatively little capital expenditures."

• **Efficiency Improved**—Key to the economics of the development is improved electric current efficiency in the process. Officials report that production increases up to 15 per cent can be expected. The new cathode materials offer the first alteration in the electrolytic reduction process on which the world's aluminum industry has been based since its invention 75 years ago.

In the conventional system, the cells (which make up potlines) are lined with baked carbon in which steel cathode bars are imbedded.

Refractory hard metals are chemical compounds of exceptionally high hardness and melting point, such as the carbides and borides of titanium and zirconium.

The companies report that further details of the development will be presented in a paper at the International Symposium of Extractive Metallurgy of Aluminum at the annual meeting of the American Institute of Mining & Metallurgical Engineers in February in New York.

Treasury Action Promises Revision of 'Useful Lives'

REVISED DEPRECIATION schedules over a broad range of industries may be forthcoming next spring, Treasury Secretary Douglas Dillon revealed last week.

In the planning stage are special engineering studies of the useful lives of machinery and equipment in the aircraft and parts, automotive, electrical machinery, metalworking machinery and machine tool, railroad, and steelmaking industries. They will be done by the Internal Revenue Service.

The action follows the analysis of questionnaires covering depreciation practices which were sent out in 1960. Treasury tax planners now want to get on-the-spot estimates from company engineers. Their aim: Gage present and future obsolescent rates in terms of technological trends.

IRS technicians plan to talk with engineers in about 50 companies and a number of trade associations in the six industries. They'll confer in Washington and visit plants.

• **Plan** — Officials emphasize that information gained from the studies will probably apply to other industries. Efforts will be made to check all industries in time for publication of the Bulletin F schedule of useful lives next spring. However, it is possible that only the six industry study will be completed.

Similar engineering studies in the textile industry resulted in cuts of as much as 40 per cent in useful lives.

Treasury officials insist that tax laws prevent them from writing a special capital investment incentive into the useful lives schedules. The administration wants Congress to handle such an incentive separately —see Page 54.

At Assembly Products, frequent visits of executives to the shop help stress quality, the firm's chief principle of operation. Others are:

- Avoiding often disastrous price competition by sticking to the development of unique products and by finding new, ingenious applications for its lines.
- Making sure sales efforts are productive. Manufacturers' agents are used only if their sales of the company's products represent a sizable chunk of their total billings.
- Avoiding underfinancing—and at the same time not having access to too much easy money.
- Offering financial incentives to key people responsible for accomplishments and keeping workers happy and enthusiastic.
- Using good management techniques, including advanced systems for handling cost accounting, inventorying, and scheduling.
- Avoiding a concentration of orders among a few big customers.

John D. Saint-Amour
President

Small Firm Succeeds on the Rebound

WHEN James J. Murley journeyed to Assembly Products Inc., in suburban Cleveland, 13 years ago, he had only one thought: To start bankruptcy proceedings against the struggling manufacturer of panel meters on behalf of its many creditors. Today, he is chairman and treasurer of the company.

Mr. Murley, who was a young attorney at the time, changed his mind when he got there. In fact, he persuaded anxious creditors to have patience. He talked the bank into lowering interest rates on the company's notes. He invested money of his own and induced his friends to do likewise.

Why?

"I liked the integrity and ability of Brad Thompson (founder of Assembly Products)," he recalls, "and became convinced that the company could be successful. It had the makings of a good product and only needed better financing, plus some sharp cost accounting."

His confidence was justified.

Today, Assembly Products has annual sales verging on $4 million —and executives feel there's no limit on the horizon. What's more, it's as well known as many larger companies.

The reason: Assembly Products was rebuilt, not without effort, on a firm foundation of sound financial management and imaginative new product development.

You'll find its products in such diverse applications as safety apparatus for atomic energy installations, in the air defense radar network, in controls on automatic grinding machines, and in the machine that checks uniformity in the manufacture of Chesterfield cigarettes.

• **The Beginning**—When Bradley R. Thompson left Cleveland's Hickok Electrical Instrument Co. in 1946 to form Assembly Products with total capital of $4000, he planned to do precision subassembly work for area manufacturers. He vowed to stay away from the fiercely competitive panel meter business which he knew so well.

By 1948, when Mr. Murley entered the picture, Mr. Thompson's original puny capital plus consid-

George J. Crowdes
Chief Engineer

Robert H. Pugsley
Sales Manager

erable borrowed money had vanished. And the firm was sinking farther into debt. The dreaded panel meters were being made to keep the shop open. By usual standards, the little company was finished.

• **Enter Mr. Murley**—In addition to adding valuable capital to the coffers and inspiring confidence among creditors, Mr. Murley brought in John P. Isham as controller, and the two instituted a stringent economy program backed by an accurate accounting system. From then on, the cost of every prospective order was calculated, and if no profit could be made, it was turned down. Quick monthly tallies and forecasts were made available to management.

In short, it became possible for the first time to tell where the company stood at any moment.

The next problem, getting a unique, salable product, was then tackled. Its one specialty, a contact meter relay, lacked reliability, but such a device had a terrific potential in indicating, monitoring, and controlling any process that could be measured electrically.

• **Enter Mr. Saint-Amour**—John D. Saint-Amour, a 22-year-old technician, took a summer job at Assembly Products in 1948, that critical year. He liked it so much he stayed and soon showed his skill with things electrical. Two years later, he was given the challenging assignment of perfecting a contact meter relay. After about six months of work with various systems, he came up with an improved variety that formed the basis for future types.

Mr. Saint-Amour's design solved the twofold problem inherent in Assembly Products' first meter relay: Maintaining a steady contact between the meter indicator and the set pointer, and the ability to break the contact sharply to avoid damage from arcing.

By 1952, after the new contact meter relay was in production, sales had risen to $393,000 from 1948's meager $30,000. Today, contact meter relays account for about half of Assembly Products' business. The Sim-Ply-Trol, a control application of the contact meter relay, brings in 25 per cent, and ordinary panel meters, beefed up with unique features, produce the rest.

Mr. Saint-Amour became engineering vice president in 1955 and president in 1957 when the founder, Mr. Thompson, relinquished active participation in the firm to form an electronic welding company, Brad Thompson Industries Inc., La Jolla, Calif.

• **Making Sure It Works**—The reliability afforded by Mr. Saint-Amour's design depends upon exacting fabrication of components and skill in assembling the delicate contact meter relay mechanism. Thorough quality control is exercised. In addition to a careful scrutiny of incoming parts, "floating" inspectors spotcheck subassemblies as they pass along the row of benches in the brightly lighted shop.

Built-in reliability coupled with constant refinement of the product and the expansion of applications help Assembly Products avoid the horrors of profit destroying price competition. Asserts Mr. Saint-Amour: "I have little sympathy with some industrialists and businessmen who are constantly crying about the horrible price competition they must engage in. As far as I am concerned, the only way to beat the competitive price squeeze is to make a better product or develop a new use for an old one. This way, the sale cannot depend simply on who offers the cheapest price."

Few of the company's brain children are patented or patentable. "We aren't particularly angry when a product is copied by a competitor," Mr. Saint-Amour explains, "because it spurs us on to more improvements and new applications. Our best asset is imaginative know-how."

• **Effort Is Rewarded**—To practice what he preaches, Mr. Saint-Amour has always tried to surround himself with creative, imaginative engineers. Many came in the early

days because Assembly Products was a "new frontier." Ideamen are kept happy with financial incentives, and bonuses have not been restricted to key executives. Every employee is rewarded when profits reach a certain level.

• **Sales Strategy**—Assembly Products' sales philosophy has also played a role in its success. Part of it evolved through experience. For example, on two occasions all hopes were pinned on a big contract. Both deals fell through almost overnight. So management learned to avoid the false security of a single large order. Its major customers—out of a client list of about 3000—take about 10 per cent of output. Military orders never exceed 30 per cent of production.

A drastic change was made in the marketing setup in the early fifties, Mr. Saint-Amour relates. Originally, selling was done by a country-wide network of manufacturers' agents, but results seemed poor. Products weren't pushed hard enough. So the agents were dropped and a "buckshot" advertising campaign was instituted. Small ads were placed in a variety of industrial publications, and circulars were mailed broadside. If any inquiry looked promising, an executive flew to the prospect to clinch the deal personally. Sales picked up strikingly.

Today, Assembly Products has its own corps of salesmen spotted throughout the country, plus selected agents for whom meter relays represent the biggest part of their business.

All sales people make periodic visits to the shop so they can keep intimately familiar with the products they are handling.

• **Reason for Success**—Good business practice is the underlying theme at Assembly Products, thanks principally to Mr. Murley's insistence on making and sticking to budgets, knowing costs, and keeping close tab on inventories. Trying to control stock levels on more than 2500 different parts would be, in Mr. Murley's words, "a well nigh impossible" task without the labors of a battery of IBM machines.

This sound management base has given the firm a secure footing for its new product development.

Construction to Top

A RECORD shattering year is ahead in spending for new construction.

The prospect: Both private and public construction segments are expected to jump 5 per cent in 1962. Expenditures for work put in place are likely to tally $3 billion more than the $57.3 billion peak anticipated this year.

The breakout: Figures from the U. S. Department of Commerce and Business & Defense Services Administration show that private construction will probably account for two-thirds of the $3 billion boost. Three-fourths of the gain in private construction is expected to come from the $24 billion slated for nonfarm residential building. The good news for suppliers, fabricators, and builders lies in the fact that virtually every private construction category should either increase moderately or remain at high levels. The Commerce Department also reports that over-all gains in private construction extend into 1963.

Spending for public construction, which declined in 1960 for the first time since World War II, is expected to climb to a record breaking $17 billion in 1961. Outlook for 1962: $18 billion.

• **Trends to Watch**—Construction costs will probably increase moderately. Materials and labor should be ample. Estimates for 1962 include a tremendous volume of construction which will be carried over from 1961. Because of the spillage, employment will be up for plasterers, electricians, and others that work in the last stages of construction.

A big question mark hovers over the housing picture. There should be about 1.4 million nonfarm housing starts in 1962—up 100,000 units vs. 1961. A total of 55,000 public housing units is in the offing compared with 50,000 put up this year. Economists are wondering if the government's action in raising the maximum limit on bank interest rates for savings accounts to 4 per cent will create higher interest rates for residential mortgages. If so, demand could be restricted.

"Basic demand for housing is not exhibiting any dynamic change and is not expected to do so until later in the sixties," warns Edwin W. Magee Jr., partner, MacKay-Shields Associates Inc., New York. "The easier terms of the Housing Act of 1961 should provide some small stimulus," but may be offset by higher interest rates. He notes that housing seems to be coming back into step with the general economy . . . but the rising trend in vacancies, particularly in rental units, produces a dampening effect.

• **Another Market**—Look for the greatest impact from the Housing Act of 1961, which liberalizes financing of additions and alterations, to occur in 1962 and 1963. Mr. Magee says lenders favor this section of the act more than other sections. Also, the total housing inventory has increased substantially, providing a larger base for home improvements. He notes that spurs will be provided by rising incomes, lower unemployment, and generally favorable business conditions. The total market in 1962: $5.3 billion—up 3 per cent from 1961.

Here's a rundown of other important private construction categories:

• **Industrial Construction** — The government reports only a 2 per cent increase is ahead for this category in 1962. Among the reasons: Manufacturing capacity is high. Emphasis on modernization to cut costs and increase productivity favors outlays for new equipment rather than plants. Modern plants require less space for new capacity. Recent rapid economic changes have encouraged conservatism in inventories and in other capital expenditures.

• **Commercial Construction**—Though rising to an all-time high of $4.8 billion, this category will gain

$60 Billion for Record in '62

slightly, 3 per cent in 1962 vs. 12 per cent in 1961. A national office building boom is on, but expenditures are expected to increase only 4 per cent in 1962. Trends: New buildings are smaller; substantial vacancies in older buildings; strong demand for modern prestige offices.

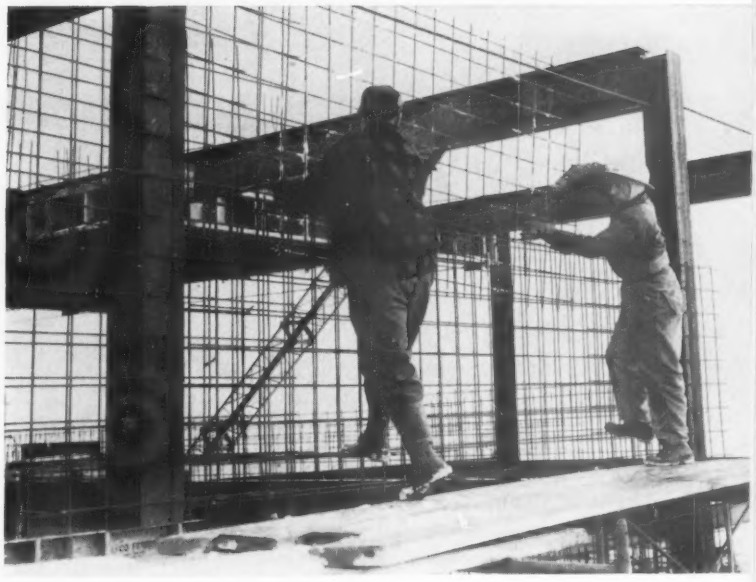
• **Other Nonresidential**—The rate of gain will be about 5 per cent in 1962, about the same as this year's pace. Leading the field will be hospital and institutional construction with an 11 per cent gain to hit $875 million. The bloom is off social and recreational construction, and expenditures will level off at this year's peak of $700 million.

• **Farm Construction**—The declining number of farms and the rising farm incomes have offset each other, bringing about a continuation of the $1.5 billion rate of 1961.

• **Public Utilities** — Spending in 1962 will go up about 2 per cent. The gas industry has deferred some spending plans beyond 1962, particularly pipeline companies. Electric light and power companies look for no change in volume, and telephone and railroad companies see 4 per cent increases in outlays for construction.

Under public construction, highways will account for the biggest single category with $6.1 billion going into roads in 1962—up $400 million from the 1961 level. Revenues in the interstate highway program trust fund provide a firm basis for the increase. More work on roads and less on bridges and overpasses is on tap.

• **Sewer Facilities**—Construction of sewers should show an 11 per cent increase in 1962. The recent Congressional grant-in-aid for sewage treatment plants was about $40 million. Total effect: A billion dollar market is opening. Spending for water installations should continue at $675 million a year—an all-time high to be established in 1961.



Where Construction Dollars Are Spent

(In Millions)

Type of Construction	1960	1961*	1962*
Private Construction	$39,603	$40,260	$42,250
Residential Buildings (nonfarm)	22,546	22,550	24,000
Industrial	2,851	2,760	2,825
Commercial	4,180	4,665	4,825
Other Nonresidential Buildings	3,137	3,315	3,475
Farm Construction	1,285	1,500	1,500
Public Utilities	5,323	5,220	5,350
All Other Private	281	250	275
Public Construction	15,953	17,065	18,000
Residential Buildings	716	835	950
Nonresidential Buildings	4,792	5,200	5,450
Military Facilities	1,386	1,375	1,375
Highways	5,464	5,700	6,100
Sewer & Water Systems	1,487	1,600	1,700
All Other Public	2,108	2,355	2,425
TOTALS	$55,556	$57,325	$60,250

Source: Bureau of the Census.
*November and December, 1961 and 1962, estimates by BDSA.

The Carrots Offered by President Kennedy to Labor and Management

PRESIDENT KENNEDY laid it on the line to both labor and management last week: Each must restrain demands that would tend to create inflation. He called for "price and wage restraints" and promised a balanced budget in fiscal 1963 to help hold down inflationary factors. The President also offered each group special treatment:

He promised management a renewed effort to get the 8 per cent tax credit for capital investment through Congress and a full program of depreciation reform similar to what the textile industry has received.

He promised labor a continued effort in Congress to close off the export of U. S. capital overseas. He said he wanted Congress to remove "artificial tax preferences for American investment in the highly industrialized countries" and stop the "unjustifiable tax avoidance loopholes available to those Americans investing in the so-called tax haven nations."

Labor is demanding that the administration cut out special tax inducements for overseas investment and a trade adjustment program in return for its support of the liberal trade program.

The trade program will not be "unilateral," the President promised; European Common Market tariffs will have to be lowered as we lower our tariffs. He said that the traditional tariff safeguards will not be done away with; rather, they will be given more meaning in the sense that they will be linked with an aid program for domestic industries and workers hurt by competition.

● **TRADE FIGHT BEGINS**—Pete R. Nebemkis Jr., Washington counsel for Whirlpool Corp., told the Foreign Economic Policy Subcommittee last week that the new look in U. S. foreign trade policy must include: 1. Free trade between the U. S. and Western Europe. 2. Freer U. S. imports from the undeveloped countries. 3. Programs to get our allies to reduce their trade barriers and help the have-not free nations. 4. A trade adjustment program to aid industries and workers harmed by foreign competition. 5. A limitation on the use of the "defense essentiality" argument as protection against imports.

Mr. Nebemkis ignored labor's argument that U. S. investment overseas should be curtailed unless made in underdeveloped nations.

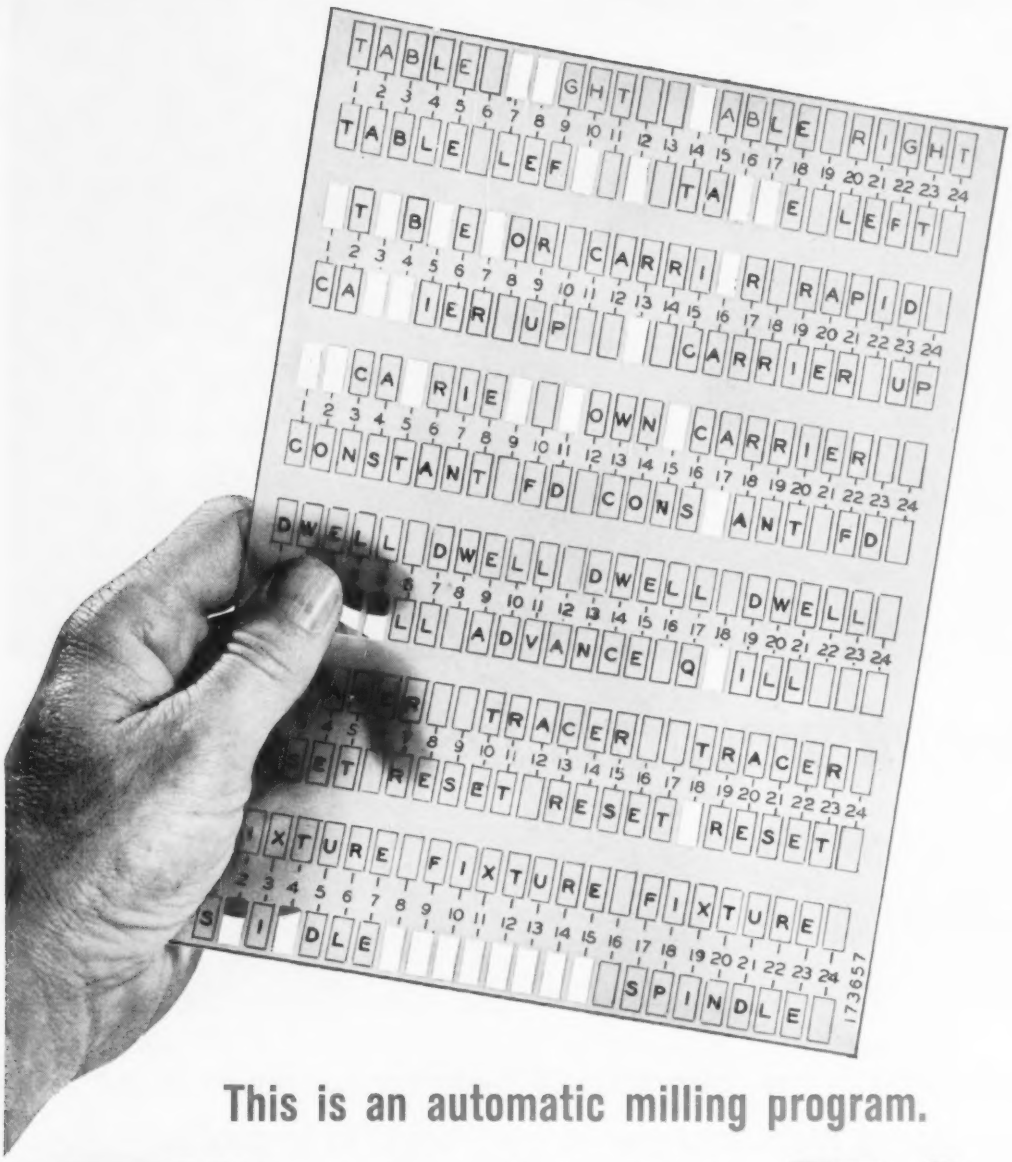
Unions also maintain that our investment overseas costs us jobs at home. The Brookings Institution has studied the impact of trade liberalization on U. S. employment. It takes this position: A unilateral program of import liberalization in the case of 72 industries now protected from foreign competition would displace 86,000 workers.

The future of the liberal trade policy program appears to depend on how many protectionists in the House of Representatives can be swayed. One source predicts 220 votes will be cast for liberal trade (a bare margin of victory) if labor joins the liberals.

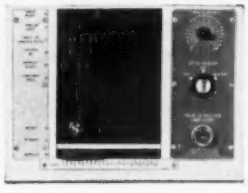
● **NASA BUDGET TO SOAR**—Space spending will rise dramatically in fiscal 1963 (the year beginning July 1, 1962), say sources at the National Aeronautics & Space Administration (NASA). Look for the President's budget request in January to be in the range of $3.5 billion to $3.8 billion vs. about $1.7 billion in the current fiscal year.

Perhaps 75 per cent of the new budget will be spent on the moon mission, including construction of industrial and launching facilities. North American Aviation Inc. has been awarded the basic vehicle contract. (The Apollo is slated to circle the moon by 1967.)

It's expected NASA's budget will be doubled next year and doubled again by 1965. The total cost of the space effort during the 1960s will probably approach $50 billion.



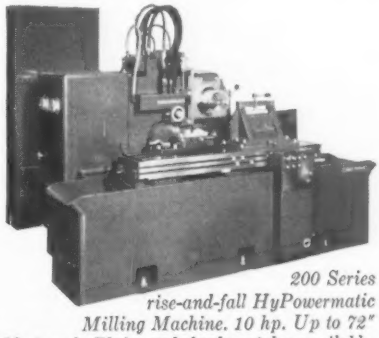
This is an automatic milling program.



Every function in an automatic milling cycle is established by this template. It fits the peg board of Telematic Control, the "brains" of CINCINNATI rise-and-fall HyPowermatics (200 Series).

The operator will simply place plugs at the positions indicated on the template, orient table and carrier trip dogs and he's ready to make parts—automatically!

Telematic provides a practical and low cost method of directing the tool path for thousands of milling jobs. We think it's the best answer to high production, automatic milling without sacrificing flexibility. Write us for publication No. M-2020-2. Milling Machine Division, The Cincinnati Milling Machine Company, Cincinnati 9, Ohio.



200 Series rise-and-fall HyPowermatic Milling Machine. 10 hp. Up to 72" table travel. Plain and duplex styles available.

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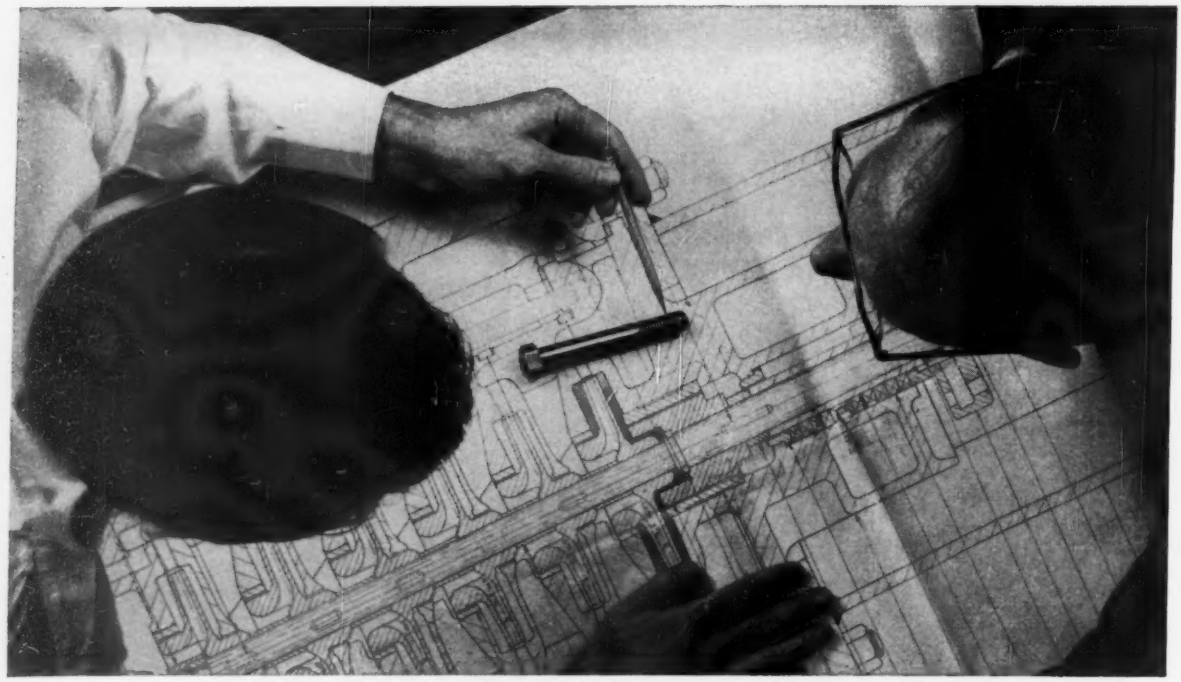


Teamwork pinpoints fastener savings

Two recommendations from RB&W fastener survey enable power equipment manufacturer to add $25,000 to profits

A power equipment manufacturer's value analysis team took a closer look at bolting practices through the eyes of an RB&W fastener specialist. Result: indirect *production* savings as well as direct *fastener* savings.

For example: a study of prints revealed that certain parts were being made with thread pitch tolerances too close...a needless cost penalty.

While inspecting three power equipment products, the RB&W man also noted...

- Costly plated socket head screws used for external joints without a recessed hole. Sheer waste! Recommendation: Substitute money-saving standard RB&W bright hex screws (SAE Grade 2).
- Body screws milled to high precision yet used in holes bored with *1/16-in.* tolerance in diameter! Again, sheer waste. Recommendation: standard RB&W high strength hex screws (SAE Grade 5).

Just these two simple recommended fastener *substitutions* alone—made on only three products—added an extra $25,000 directly to this company's profits for the year through reduced purchasing costs.

That's real dollar-sign engineering.

Are you sure your Company isn't wasting pure profit dollars on unrealistic fastener specifications? Let an RB&W fastener expert survey them...cooperate with your engineers. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N.Y.

R B & W

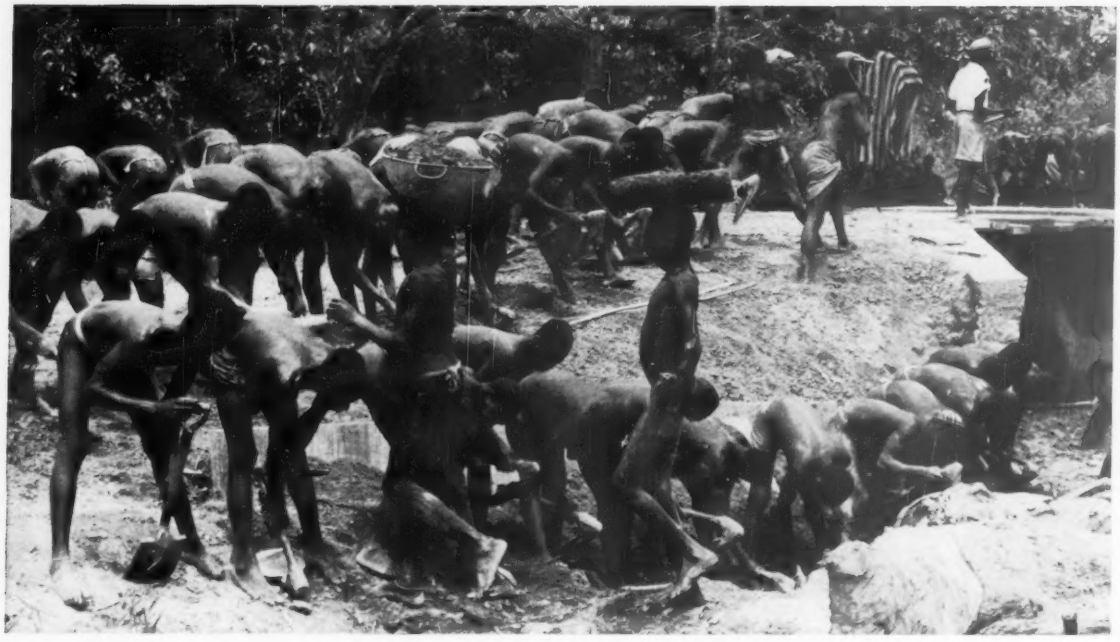
117th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Sales office and warehouse at:** San Francisco, Calif. **Sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago. **Sales agents at:** Cleveland; Milwaukee; Denver; Fargo.

WORLD MARKETS NUMBER 4

NIGERIA

New Africa at Its Best



QUESTION: Can you market your goods in a nation where witchcraft is practiced extensively, where most roads are dirt or gravel, where some 250 languages are spoken, where feudalism still exists, and where less than 10 per cent of the population can read and write?

ANSWER: You probably can; many firms do. In fact, you probably can't afford to ignore the market; it is potentially the largest in Africa and could well become one of the more important trading partners of the U. S.

The market is Nigeria, an independent nation since Oct. 1, 1960. It has been endorsed by highly respected international authorities to a degree surpassed by few underdeveloped areas.

Examples:

"Nigeria is probably the most hopeful, and best prepared, as well as the largest, of the now growingly important new African nations"—S. J. Rundt, New York consultant on international trade and investment.

"In addition to the inducements offered foreign investors, Nigeria's membership in the British Commonwealth, her continuing close relations with the Free World, and the vigor with which the country is applying its own resources to the tasks at hand make Nigeria well worth a close examination by the overseas business world"—Foreign Information Service, First National City Bank of New York.

"As a result of the removal of almost all restrictions on imports from the dollar area and the existence of high Nigerian interest in trade with the U. S., American exports to Nigeria can be substantially increased" — Report of a U. S. Commerce Department trade mission.

Why such glowing comments about a nation that lies in a troubled continent, has been independent for only 14 months, and is highly heterogeneous

Quick Facts on Nigeria

POPULATION—No one knows exactly. Best estimates: Nearly 40 million. Nigeria is by far the most populous nation in Africa, with about 1 in 6 of the continent's inhabitants. The nation is the fourth most populous in the commonwealth and 13th in the world. It has more Negroes than any other country; the U. S. is second.

AREA—373,250 square miles, or about the size of Texas, Oklahoma, and Louisiana combined.

LANGUAGE—English is official and is used in commerce. There are more than 250 tribal tongues.

CURRENCY—The Nigerian pound equals $2.80 (same as British pound). The pound is divided into 20 shillings equal to 14 cents each. The shilling is equal to 12 pence.

WEIGHTS and MEASURES—Imperial weights and measures are used. A long ton equals 2240 lb, a hundredweight (cwt) equals 112 lb, a cental equals 100 lb, and an imperial gallon equals 1.2009 U. S. gallons. Some manufacturers use the metric system.

CAPITAL—Lagos, a coastal city in the western region.

MAJOR CITIES—Ibadan (population: around 500,000), Lagos (around 300,000), Ogbomosho and Kano (around 150,000 each), Oshogbo, Ife, and Iwo (each in excess of 100,000).

GOVERNMENT—A British colony for 99 years, the nation achieved independence Oct. 1, 1960. It has a federal form of government, with four components—Western, Eastern, and Northern Regions, and the federal district of Lagos. Legislature is bicameral. The nation has become the 99th member of the United Nations, the 38th contracting party to GATT (General Agreement on Tariffs & Trade), and a member of IMF (International Monetary Fund).

RELIGION—The Northern Region is predominantly Moslem; the East is about equally divided between Christians and pagans, with a few Moslems; in the West, Christians slightly outnumber Moslems.

COMMUNICATION—Radio broadcasting includes a nationwide network. Two TV stations are in operation. About 40,000 telephones are in use.

FOR MORE INFORMATION—Queries involving trade and investment should be addressed to the Federal Ministry of Commerce & Industry, Lagos. Much helpful information is contained in the following publications:

Handbook of Commerce and Industry in Nigeria, available from the Nigerian Mission to the UN, 575 Lexington Ave., New York.

The Economic Development of Nigeria, Johns Hopkins Press, Homewood, Baltimore 18, Md. (Report of a mission organized by the International Bank for Reconstruction and Development.)

Market for U. S. Products in Nigeria, Import Tariff System of Nigeria, and *Preparing Shipments to Nigeria*, available from local U. S. Department of Commerce field offices.

Rundt's Market Report No. 295, issued Oct. 21, 1960, by S. J. Rundt & Associates, 130 E. 63rd St., New York 21, N. Y.

Nigeria Trade Summary (monthly) and *Digest of Statistics* (quarterly) are available from the Federal Office of Statistics, Lagos.

For information on regional investment opportunities and arrangements, contact: (1) Secretary, Northern Regional Development Corp., Kaduna, (2) Secretary, Eastern Region Development Corp., Enugu, (3) Secretary, Western Nigeria Development Corp., c/o Secretariat, Ibadan.

geographically, ethnically, religiously, and linguistically? These reasons stand out:

1. Nigeria has made great strides in the practice of responsible government.

Enlightened British leadership in the years prior to Nigeria's independence have given the nation a generation's experience in building its own trained and competent civil service.

2. Nigeria's leaders are ambitious about the development of the country's natural resources.

They include tin, columbite, lead-zinc, quartz, agricultural resources, water resources, timber.

3. The federation's school system is reasonably well established.

Its 17,000 primary schools are attended by more than 2.6 million children; 700 secondary schools have 114,000 students; 330 teachers' colleges have more than 25,000 enrollees; four universities have around 2000 students (and a fifth is being organized); and about 8000 students are in overseas institutions, largely in the United Kingdom.

4. There is no color bar in Nigeria—against either Negroes or whites.

Private clubs founded by the British have Negro members; white residents and visitors are treated with courtesy and friendliness.

5. The nation has a well developed banking system.

In addition to such indigenous institutions as the National Bank of Nigeria Ltd., and the Bank of Lagos Ltd., British banks such as Barclay's are much in evidence, and U. S. banks, including Chase Manhattan, have opened branches.

6. The government of Nigeria welcomes foreign capital.

It's an example of squarely facing a necessity. Rapid development of the country's resources and planned improvement of the standard of living are hardly possible without it. To attract foreign capital, the country has established a program of tax incentives, including generous depreciation allowances, and, in some cases, a tax holiday of up to five years. Another law permits the government to refund import duties on materials that are not locally available.

7. Perhaps most important, the nation represents the potentially largest market in Africa.

While only a few of its citizens could be called effective consumers in the American sense, demand is growing, and the potential gain of supplying a market of 40 million people can be a powerful magnet.

- **U. S. traders have much undeveloped potential.**

A U. S. Trade Mission to Nigeria reported that "as a general market, it presents an open field for U. S. merchandise of almost all descriptions." However, the mission was careful to point out that regional diffences—in cultures, per capita income, and other factors—mean that sales potentials may vary significantly from region to region.

The mission said sales potential is good in Nigeria for U. S. marketers of:

- Electrical appliances, especially room air conditioners and small refrigerators (220 volt current).
- Compact cars.
- Medical equipment and supplies.

- Lightweight metal furniture and fixtures.
- Office equipment.
- Construction machinery.
- Agricultural equipment.
- Machine tools.
- Construction materials, particularly prefabricated building supplies.
- Machinery to process Nigerian produce, such as vegetable oil mills, cotton ginning equipment, textile machinery, petroleum equipment.
- All kinds of inexpensive jewelry.
- Canned and frozen foods, clothing, and other items.

- **But the U. S. has not properly cultivated the market.** The mission reported: "Among African businessmen and consumers, there is a high regard for the "Made in U. S. A." label, yet the label is almost never seen in Nigeria." The nation purchased $602 million worth of goods from foreign sources last year, and the U. S. supplied only 5.4 per cent. The United Kingdom is by far Nigeria's largest supplier, followed by Japan and Germany. The Netherlands and the U. S. are tied for a poor fourth.

Principal U. S. exports to Nigeria in 1960 (in millions of dollars):

Industrial Machinery	5.9
Grains & Preparations	5.8
Textiles	3.7
Tobacco Products	2.4
Construction & Mining Machinery	2.0
Autos & Parts	1.9
Tractors & Parts	1.7
Electrical Machinery	0.6

In all cases, U. S. shippers have fallen far short of their potential. The main reason is failure to properly cultivate the market. Businessmen who have visited Nigeria point out that the nation's imports are growing rapidly and that this is the time to get a foot in the door because Nigerians traditionally exercise strong brand loyalty. For example, one New York banker told STEEL: "It would be virtually impossible for other manufacturers to unseat Singer, Coke, or Pepsi in Nigeria."

Brand preferences are built largely by word of mouth. The Nigerian government is making good strides toward its goal of 85 per cent literacy by 1970, but today only about 3 million Nigerians are literate. Most consumer advertising is done via billboards, though radio and TV are rapidly gaining popularity. No Nigerian newspaper has a circulation of more than 150,000 (though it is claimed that an average of ten or

Miners wash in stream at shift change

Overhauling an engine at Ikeja Airport

more persons reads each copy).

• Nigeria is three distinct markets.

It is extremely important, especially for the marketer of consumer goods, to recognize that the Federation of Nigeria is divided into three self-governing sections that differ greatly in almost every respect:

The Northern Region, with three-fourths of the nation's land area and more than half its citizens, is predominantly Moslem. It is the least developed of the three regions, has the lowest per capita income, and is the strongest politically. A form of feudal rule is still widespread, with emirs controlling their little communities with their own troops. Except in the city of Kano, industrial development has been slow. The region has a wealth of natural resources; it produces 9 per cent of the world's tin and 90 per cent of the world's columbite. It is also the world's largest exporter of whole shelled peanuts.

The Eastern Region, in the tropical coastlands, has around 8 million people (half Christians, half pagans). This region includes most of the Niger River delta—one of the most thickly populated areas in Africa. It is the oil rich section. And it is attracting industry; among plants already operating: Furniture factories, an aluminum rolling mill, a bicycle part plant, a nail manufacturing industry, a tire and tube factory. It is the likely site for an iron and steel complex, now in the planning stages by Nigeria Steel Associates—an organization owned by Koppers International, Westinghouse Electric International, and United Engineering & Foundry Co. Chase International Investment Corp. is also in on the negotiations. The region already has a rerolling mill near Enugu. Television is popular in the Eastern Region, and top programs include *Lassie, The Lone Ranger,* and CBS-TV news films. A Pepsi-Cola bottling plant near Onitsha turns out about 72,000 bottles daily. Nigerians crave carbonated beverages and doughnuts.

The Western Region is geographically the smallest and has about 8 million people. Christians slightly outnumber Moslems. This region is the home of the Yoruba, the most "Westernized" of Nigeria's tribes. The region is also the most industrialized and is the most highly developed commercially. Among goods produced in this region: Plastics, LP-gas, steel windows and door frames, prestressed concrete, aluminum household utensils, textiles, metal containers, innerspring mattresses, boats, and wrought iron work.

• The ancient way of Africa is still powerful in Nigeria.

Just under the surface of the nation's 20th Century civilization is the product of centuries of tribal culture. S. J. Rundt points out that juju, or witchcraft, remains a problem although it has been officially banned. He says: "In the teeming, open air markets of Lagos and Ibadan, one does not find juju stalls marked as such, yet you have no difficulty buying ground monkey heads, serpent fangs, and even weirder ingredients of black sorcery."

However, such shenanigans fall far short of outweighing the advantages Nigeria offers, and the nation is becoming more and more attractive as both market and investment area.

• A trade fair is planned.

You'll be able to show your wares via the first Nigerian International Trade Fair on Victoria Island, Lagos, Oct. 27 through Nov. 18, 1962. For information, contact the Nigerian Consulate General, 575 Lexington Ave., New York 22, N. Y.

• Here are trading tips.

• When packaging your product, keep in mind that an African uses the package as well as its contents. He seems, for example, to prefer bottles to cans because he can carry water in the bottles.

• Package in small quantities: Cigarettes are bought singly, sugar by the lump, perfume by drops.

• Because many items we consider essential are luxuries for the Nigerian, he takes a great deal of time shopping about and is a discriminating buyer. A shirt, for example, takes a sizable part of the weekly wage of a laborer. It will be worn only on special occasions.

• Watch colors. In the Northern Region, some are offensive; in the Western Region, blue is highly favored by the Yoruba people.

• Door locks add to the sales appeal of refrigerators.

• U. S. makers of consumer goods may be impeded by the big, foreign owned trading companies which have been reluctant to switch away from traditional sources of supply. That tendency has helped the United Kingdom, hindered the U. S. But more and more volume is being handled by Nigerian traders who generally give a fine reception to U. S. goods.

• Statistical data on Nigerian economic trends are scarce.

That's because it's tough to compile anything but rough estimates in a country where only a minority of the populace is engaged in activities that can be statistically measured.

Per capita income is roughly estimated at $85 per year. The gross national product, estimated at $2.3 billion in fiscal 1956 (fiscal years begin Apr. 1), may this year exceed $2.8 billion. About 30,000 passenger cars and 24,000 commercial vehicles are in use. Some 530 million kw-hr of electricity was produced last year.

• Wages are extremely low by U. S. standards.

Unskilled workers earn less than $1 a day. Skilled workers earn from $1.25 to $3 daily. There is an abundance of labor available, and the Nigerians are eager to learn. Absenteeism isn't a problem.

• Nigeria merits your investigation.

The Economic Development of Nigeria summarizes the situation this way: "In the basic resources needed for industrial development, Nigeria is more fortunate than many another country. It has good labor supply, numerous important raw materials, a large home market with incomes gradually rising, and at least a part of the necessary investment capital. The principal ingredients in which the country is deficient can be grouped under the heading of human experience, which can and will be acquired in time."

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, *Penton Bldg., Cleveland 13, Ohio.*

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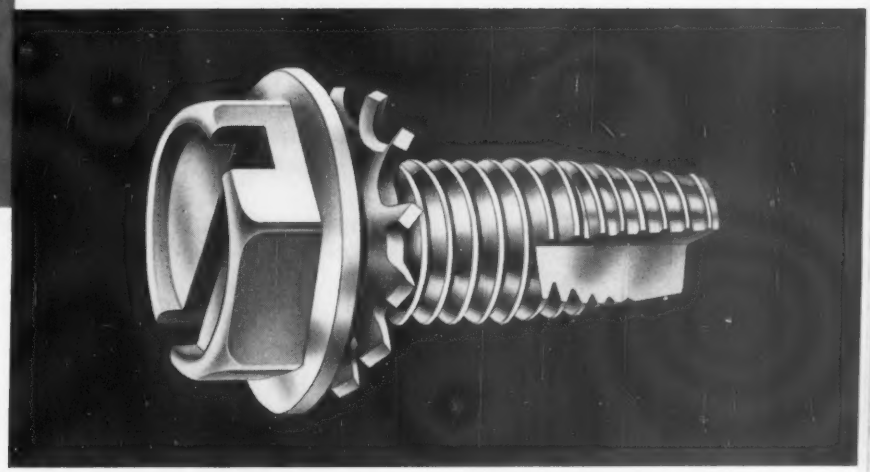

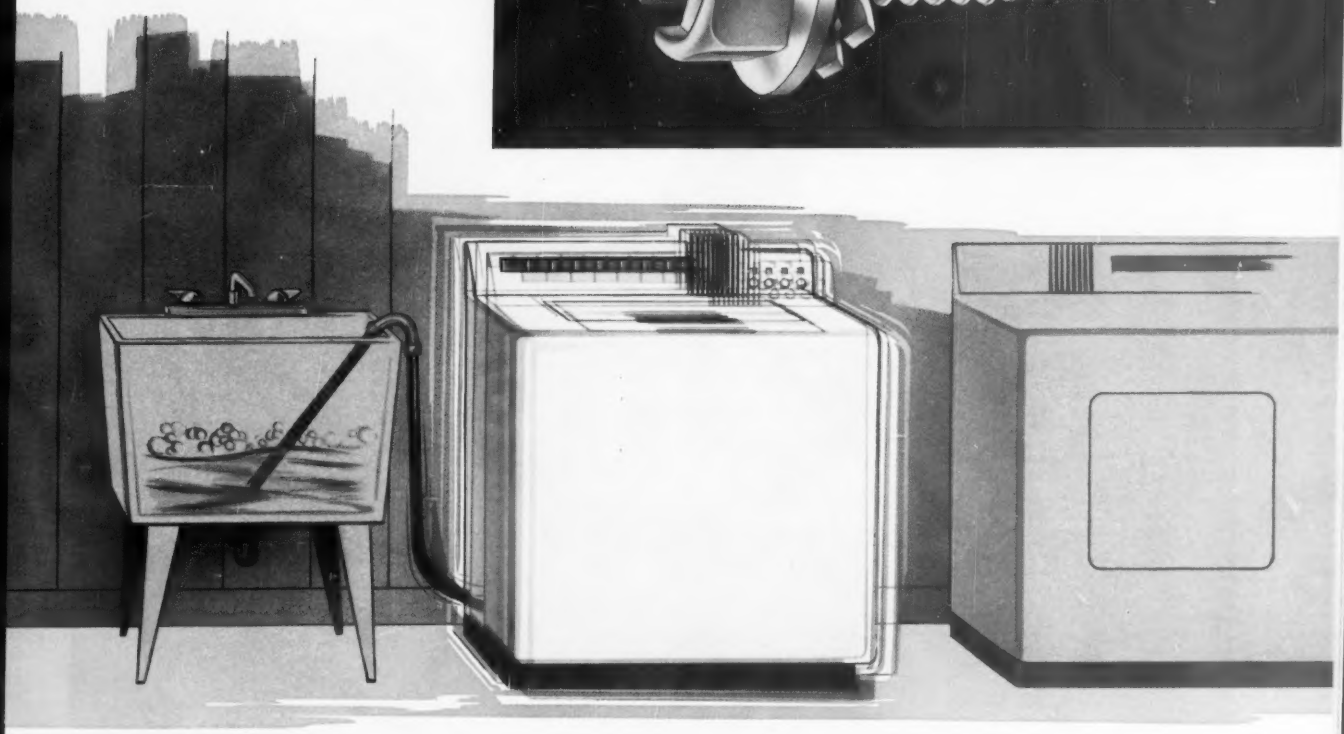

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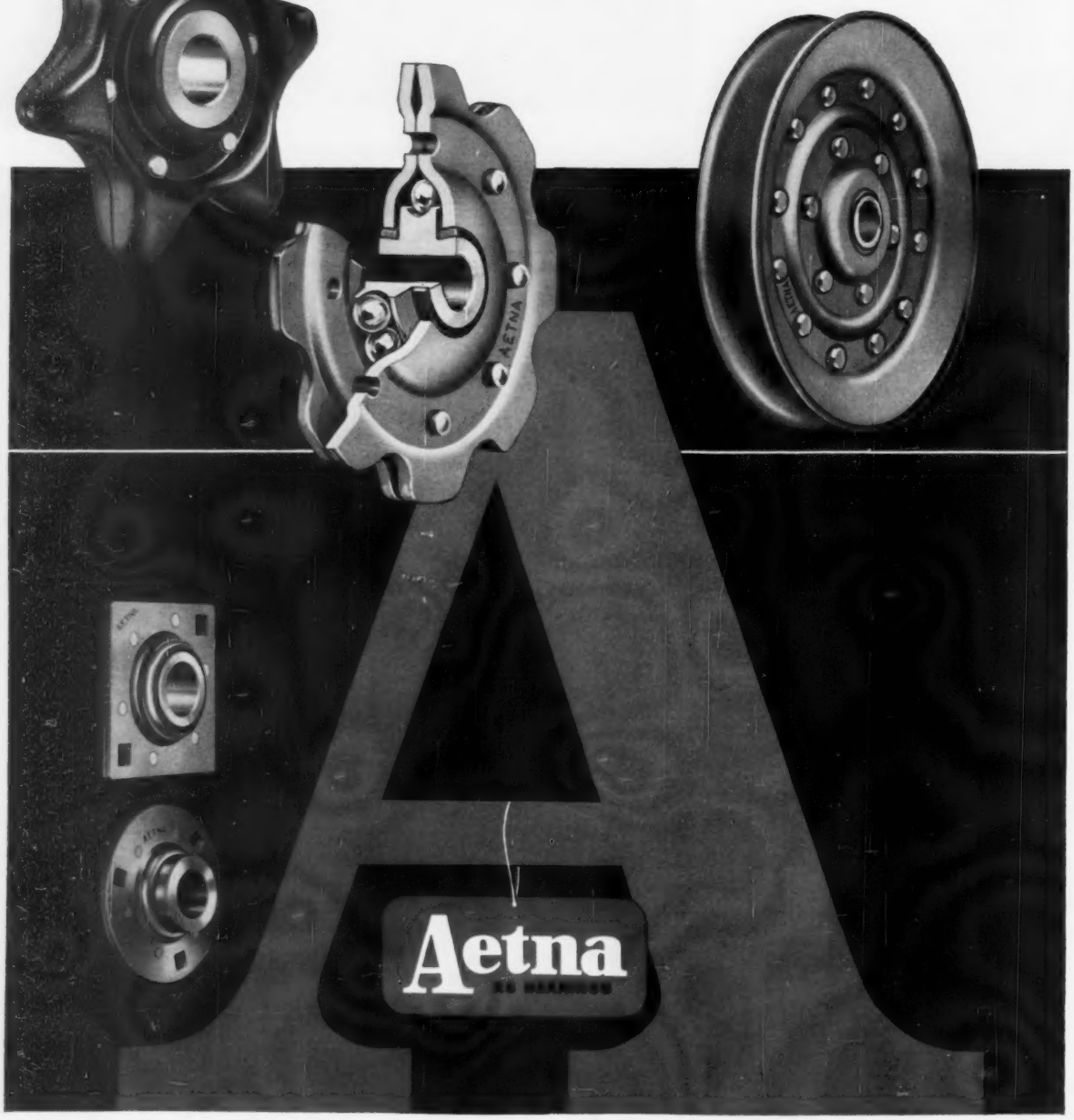
ANTI-FRICTION SUPPLIERS TO LEADING ORIGINAL EQUIPMENT MANUFACTURERS SINCE 1916



Wagons Hold 16% of Car Market

AUTOMAKERS BUILT 865,000 station wagons during the 1961 model run vs. 924,000 in 1960. That's 16 per cent of the market compared with 15.4 per cent last year and 16.7 per cent in 1959. Sales executives predict the same level of penetration next year. They feel sales won't expand until after 1965. Reason: An increase in newly formed families at that time.

Currently, wagon builders are jousting for a bigger slice of the market. Ford and Falcon models are the most popular with buyers. They account for 31 per cent of sales.

In the last two years, Buick's wagon production has soared 111 per cent. Oldsmobile's is up 53 per cent, Pontiac's 15 per cent. Compact wagons explain the gains, says *Ward's Automotive Reports,* which considers wagons a market indicator. Adds *Ward's*: "A company not getting its fair share of (compact) wagon buyers generally does not do well in the compact field as a whole."

There's no doubt that the smaller wagons are going places. Their share of the market has climbed from 35 to 50 per cent in one year. The gain (100,000 units) represents a loss of 10,000 tons of steel to metalworking. On the average, the compacts take 200 lb less metal than their standard sized counterparts. The industry offers 43 compact wagon models this year against 36 standard jobs.

● **Side Effect**—Six cylinder engines were in 56 per cent of this year's wagon output, a 21 per cent hike

How Wagons Measure Up

Make	Price	Max Length (Inches)	Cargo Space Dimensions: Min Width (Inches)	Cargo Space Dimensions: Rear Opening (Width, inches)	Cargo Space Dimensions: Total Volume (Cubic feet)
STANDARDS					
Chevrolet	$2,725	94.0	46.0	56.5	87.0
Pontiac	3,193	92.3	48.5	56.4	86.5
Oldsmobile	3,460	92.6	48.5	54.4	86.5
Buick	3,836	92.7	48.2	54.4	86.7
Ford Galaxie	2,829	98.8	44.9	50.4	99.6
Mercury Monterey	2,920	98.8	44.9	50.4	100.0
Plymouth	2,609	94.3	45.0	49.0	84.4
Dodge Dart	2,644	94.3	45.0	49.0	84.4
Chrysler	3,478	100.7	45.8	49.2	91.5
Rambler	2,380	82.5	43.1	49.7	73.8
COMPACTS					
Chevy II	2,339	86.0	43.0	47.5	76.2
Corvair*	2,407	77.0	39.0	46.5	68.0
Tempest*	2,511	82.9	44.1	49.5	72.6
F-85	2,754	83.5	44.1	49.6	71.0
Special	2,655	82.5	44.1	49.5	72.0
Falcon*	2,298	85.8	42.1	45.5	76.2
Comet*	2,396	85.8	42.1	45.5	80.0
Valiant*	2,285	82.6	43.6	40.7	67.7
Lancer*	2,306	82.6	43.6	40.7	67.7
American*	2,081	73.7	40.6	39.2	57.3
Lark	2,405	82.5	42.0	45.0	74.0
SPECIALS					
Chevy Greenbriar	2,655	117.5	44.5	46.0	175.5
Falcon Bus	2,287	106.1	48.2	49.4	204.0

Lowest starting prices are shown. They include excise tax and suggested handling charges. They do not include accessories, optional engines, local and state taxes, or transportation. Length is from rear of front seat to closed tailgate. Width is between wheel wells. Add 10 to 15 in. for maximum floor widths. Rear opening is at floor level.
*Does not offer nine passenger models.

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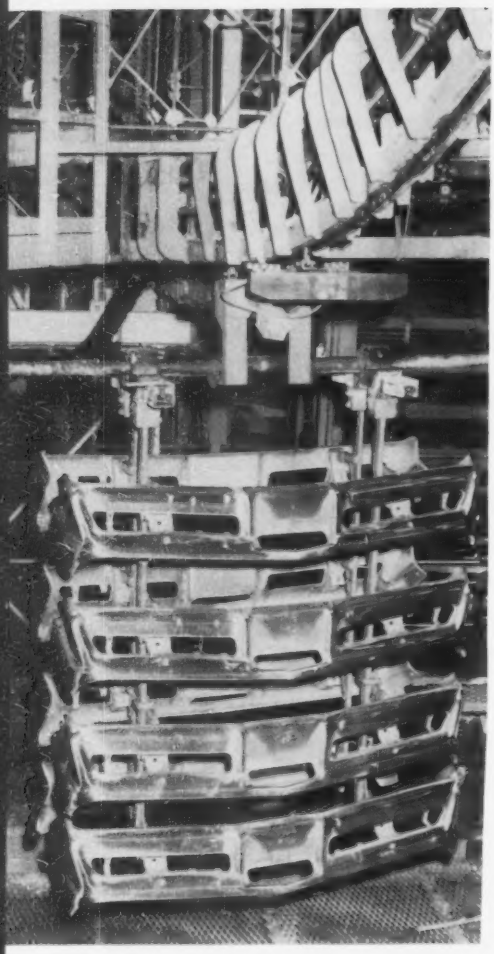


Olds bumpers get dual nickel plating

Oldsmobile Moves to Prefinished Bumper Steel

DURING the first quarter of 1962, GM's Oldsmobile Div. will be switching from conventional cold rolled steel to prefinished stock for all of its bumpers. It's already using some prefinished material for its big cars and on the F-85.

Economics dictate the change. Much of Oldsmobile's buffing equipment has been in operation since 1948. It will be cheaper to buy prepolished stock than it will be to continue using the older machines or to replace them. The Lansing, Mich., carbuilder does not reveal costs, but STEEL estimates the switch may save up to 25 cents per car. Jones & Laughlin Steel Corp. is the only supplier of the material at present. J & L calls its product Surfaglaze. The material arrives phosphated, polished, and coated with a dry stamping compound. It needs only to be blanked before sending to the press lines.

Unlike many car divisions, Oldsmobile makes all of its own bumpers. It also supplies bumpers for the Buick Special. It's using about 6500 tons of bumper stock monthly.

Two stamping lines are available for bumper production. One has 11 presses, the other 12. Bumpers are drawn, trimmed, flanged, and holes pierced in them for attaching brackets and license plates. Rated output is 190 units an hour for the big bumpers. Production for the smaller cars runs at rates up to 240 an hour. After the bumpers are formed, overhead conveyors carry them to a line where two mounting brackets are welded onto rear bumpers. No brackets are needed for front bumpers.

Dual nickel plating has been used on Oldsmobile bumpers since the middle of the 1961 model run. Parts go through a typical cleaning and etching cycle and are copper plated. The copper is buffed to give it luster. The parts then get another copper strike and applications of semibright and bright nickel. After rinsing and inspection, bumpers are reracked for chrome plating. They're in the chrome tank for 4 minutes. Oldsmobile's specifications call for a combined copper and nickel thickness of 0.002 in. Chrome thickness is 0.000010 in.

Olds says bumpers are withstanding up to 160 hours in the Cass test without showing visible signs of corrosion. Temperature of the copper bath is held at 180° F. The semibright nickel tank is maintained at 145° F, the bright nickel at 165° F. Temperature of the chrome bath is 130° F.

Finished bumpers for the big car weigh 29 lb (front) and 34 lb (rear). The F-85 bumpers weigh 14 lb each.

over the 1959 figure.

The four door wagon with two seats is the most popular style. It accounts for 76 per cent of wagon sales. Only Falcon, Comet, and Rambler American offer two door models this year. General Motors dropped its two door models this year. Result: Its penetration into the three seat, four door category climbed 10 per cent. GM wagons now take half of the sales in this category.

Another gainer: The van type wagons or buses offered by the Chevrolet and Ford divisions. Each builder will turn out 15,000 this year. But sales of this body style aren't expected to improve much next year. Studebaker-Packard Corp., which claims it has the most rugged compact wagon, offers a heavy duty option that includes a beefed up frame, overload shock absorbers and springs, and a truck engine. Other automakers indicate that they think such upgrading should be reserved for larger wagon models.

1961 Wagon Output
(Thousands of units)

GM	317
FMC	315
Chrysler	99
AMC	125
S-P	9
Total	865

U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
June	599,474	613,136
July	399,191	434,377
August	195,266	305,514
September	354,711	407,691
October	557,200	617,972
November	646,040†	597,638
11 mo. Totals	4,929,125†	6,172,686
December	.....	523,422
Total	.....	6,696,108

Week Ended	1961	1960
Nov. 4	152,855	145,537
Nov. 11	152,286	138,682
Nov. 18	154,230	149,753
Nov. 25	124,292	111,091
Dec. 2	164,919†	135,348
Dec. 9	160,000*	135,328

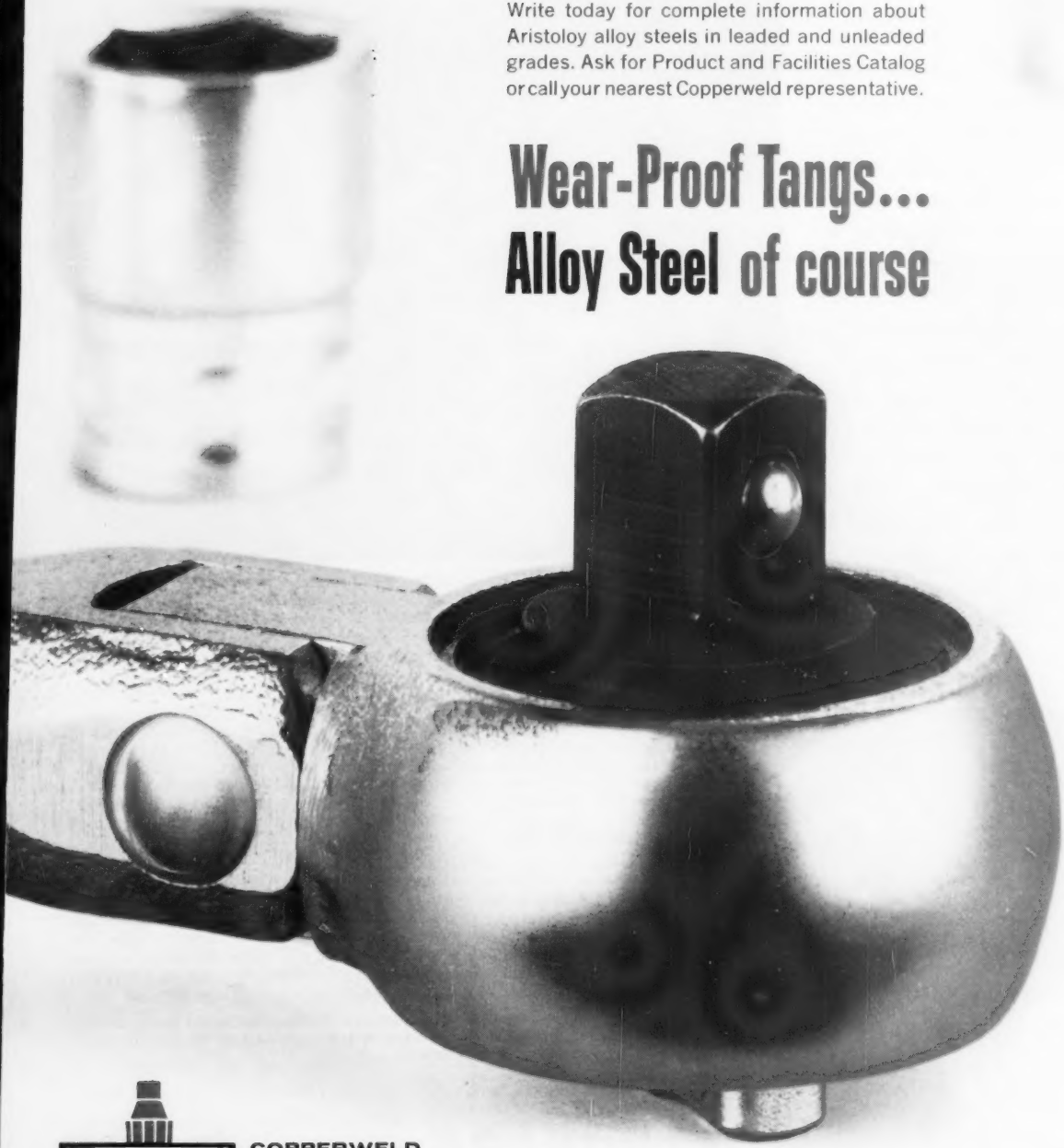
Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

250,000 full turns, more than a lifetime of service, and the amount of wear on ratchet drive lugs, or tangs, is practically unnoticeable. Corners remained sharp and clean and the surface unmarred.

What kind of steel does New Britain specify for these vital parts? What kind of steel offers this combination of high torque strength, high surface resistance to wear and Brinelling, plus uniform machinability? An alloy steel, of course . . . Aristoloy 4150 to be specific.

Write today for complete information about Aristoloy alloy steels in leaded and unleaded grades. Ask for Product and Facilities Catalog or call your nearest Copperweld representative.

Wear-Proof Tangs... Alloy Steel of course



ARISTOLOY STEELS

COPPERWELD STEEL COMPANY
ARISTOLOY STEEL DIVISION

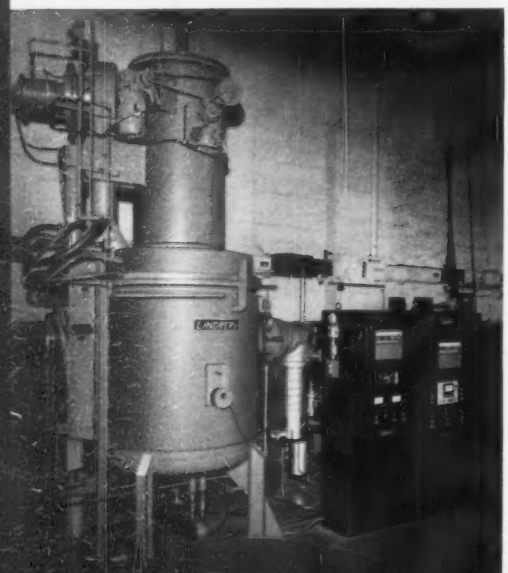
4005 Mahoning Ave., Warren, Ohio • EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.

J. WALTER REX tells why he chose Lindberg equipment for his new Florida plant

QUOTE from Mr. Rex

"When we designed our new plant, Rex of Florida, Inc., we made sure we could provide the Florida metal working industry with complete heat treating services. After carefully surveying the industrial activities we would serve we knew we would be called upon to offer scientifically controlled, high quality heat treating for a variety of metals, both ferrous and non-ferrous, and an unusual diversity of sizes, shapes and weights. Our long experience with Lindberg furnaces and atmosphere controls assured us that we could depend on Lindberg equipment to help us meet most efficiently the widely varying demands of our Florida customers."

J. Walter Rex, President, Rex of Florida, Inc., Fort Lauderdale, with Lindberg high temperature, all-purpose furnace, one of six Lindberg units specified for this new plant. Mr. Rex, also President, J. W. Rex Company, Lansdale, Penna., is recognized as one of the foremost metal working authorities and his commercial heat treating operations are among the largest and most important in the country, particularly in treating components for rockets and missiles.



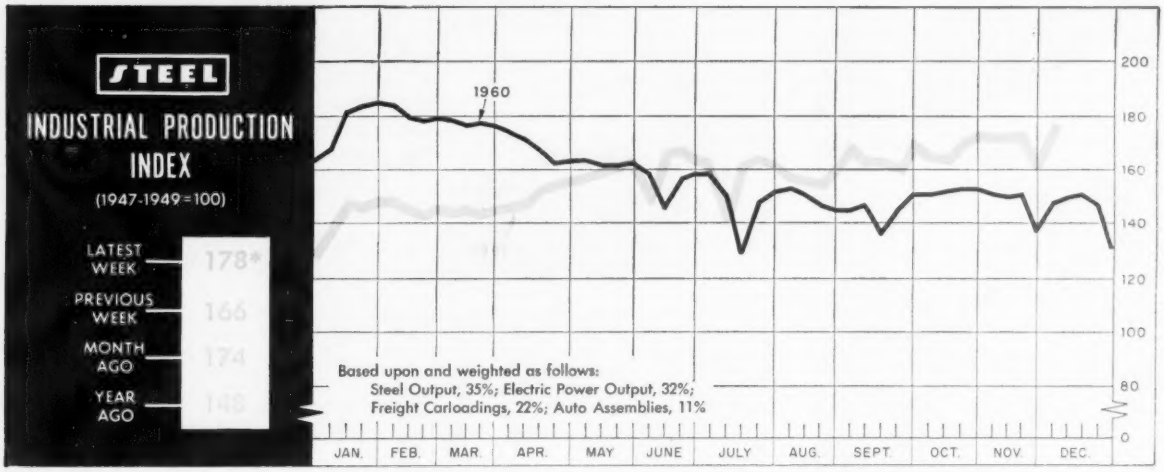
Latest Rex purchase from Lindberg—new vacuum furnace for Lansdale, Penna., plant

Mr. Rex's confidence in the ability of Lindberg equipment to meet the most exacting commercial heat treating requirements is based on the years of efficient and dependable service rendered by Lindberg units in his commercial heat treating operations. He has been a Lindberg customer for nearly 20 years. We're glad that he has found our equipment so satisfactory. We're very well satisfied with Mr. Rex as a customer, too. Altogether, including the units for Rex of Florida, Inc., he has purchased 34 Lindberg units over the years.

Lindberg offers the most complete line of fuel-fired and electric furnaces and equipment for heat treating ferrous and non-ferrous metals available to industry. If you have any problem in heat treating, get your local Lindberg representative's help now. You can depend on his experience and Lindberg's engineering and design know-how to provide exactly the right equipment for your need. And it's easy, too! Just call your Lindberg Field Engineer (he's listed in your classified phone book) or write us direct. Heat Treating Furnace Division, Lindberg Engineering Company, 2441 West Hubbard Street, Chicago 12, Illinois.

Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 9, Ont. Also, Lindberg plants in Argentina, Australia, England, France, Italy, Japan, Spain, Switzerland and West Germany.

LINDBERG
heat for industry



*Week ended Dec. 2.

Production Climbing Fast at Yearend

INDUSTRIAL PRODUCTION, as measured by STEEL's index (above) is at its highest point since early March, 1960, and is less than 4 per cent below the all-time high set in January, 1960. Whether that mark (185 per cent of the 1947-49 average) is eclipsed this year depends on one thing—the course of the steel industry.

At a preliminary 178 for the week ended Dec. 2, the trend line bounced back from the Thanksgiving week to a level 3 points above the preholiday pace, which was the previous 1961 peak. That fits the pattern of previous years which ended on a strong uptrend. If the pattern holds, a further expansion of 3 to 6 points can be expected before the Christmas holiday, which would be barely shy of the record level.

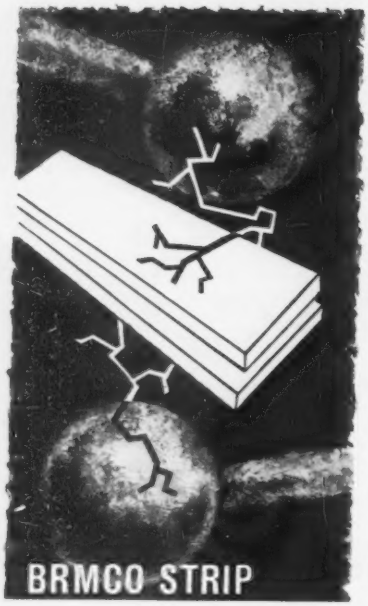
• **Push for Autos, Steel**—Automakers are putting together a string of production figures which may be the best since the plush days of 1955-56. November auto output was about 646,000 units. That will be followed by another 634,500 units this month, says *Ward's Automotive Reports*. January is scheduled for about 680,000 cars, and the first quarter of 1962 is keyed in at 1,837,600 autos. *Ward's* points out that if the schedules are met, production for the six months from October through March will be the best on record for the period.

Such heavy planning already is putting pressure on the steel mills. Automakers began stepping up orders for steel about Nov. 15, although shipments are not expected to rise dramatically until after Jan. 1 because of tax considerations. However, mills are beginning to increase their stocks of semifinished materials in preparation for a flurry of release orders next month. Other users, not wishing to get caught in the auto rush, quickly responded

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	2,100[1]	2,073	1,396
Electric Power Distributed (million kw-hr)	16,000[1]	15,330	14,773
Bituminous Coal Output (1000 tons)	7,355[1]	8,890	6,559
Crude Oil Production (daily avg—1000 bbl)	7,200[1]	7,210	6,984
Construction Volume (*ENR*—millions)	$449.8	$304.8	$385.0
Auto, Truck Output—U. S., Canada (*Ward's*)	200,903[1]	156,214	166,596
TRADE			
Freight Carloadings (1000 cars)	575[1]	495	523
Intercity Truck Tonnage (changes from year ago)	+9.2%	+13.6%	−5.6%
Business Failures (Dun & Bradstreet)	238	308	276
Currency in Circulation (millions)[2]	$33,500[1]	$33,351	$32,638
Dept. Store Sales (changes from year ago)[2]	+6%	+4%	−2%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$24,618	$31,763	$22,732
Federal Gross Debt (billions)	$297.0[1]	$295.9	$290.6
Bond Volume, NYSE (millions)	$33.6	$34.4	$30.9
Stocks Sales, NYSE (thousands of shares)	22,283	21,900	16,809
Loans & Investments (billions, adjusted)[3]	$117.2	$118.2	$108.3
U. S. Govt. Obligations Held (billions)[3]	$33.9	$34.2	$29.4
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	224.7	223.0	221.8
All Commodities[6]	118.8	118.8	119.6
Commodities Other than Farm & Foods[6]	127.5	127.5	127.8

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.



CUSTOMER REPORTS

246 ORDERS RECEIVED / 000 ORDERS REJECTED

An electrical components manufacturer, with exacting material requirements, received 246 orders from BRMCO last year . . . without rejecting a single pound of material.

This example, typical of BRMCO's service to all customers, points out BRMCO's ability to produce and deliver strip aluminum, brass, and bronze to meet the most rigid specifications . . . every time, on time. It also indicates the value of BRMCO's custom packaging, which protects the metal from damage, besides economizing on storage space and making in-plant handling easier.

Check into the many advantages of specifying BRMCO Strip . . . not the least of which are "Specific-Date" delivery and reduced material costs.

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BRMCO

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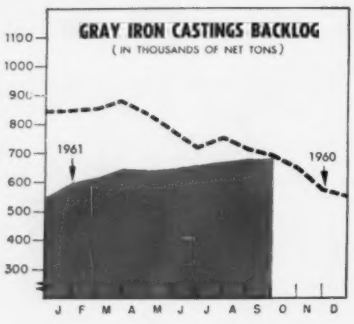
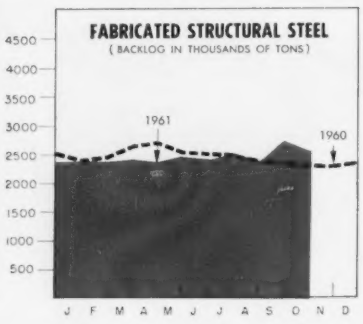
THE BUSINESS TREND





	Shipments 1961	Shipments 1960	Unfilled Orders* 1961	Unfilled Orders* 1960
Jan.	760	1,136	600	851
Feb.	702	1,108	621	855
Mar.	856	1,143	652	880
Apr.	869	1,051	645	834
May	982	1,053	651	782
June	1,027	1,050	666	720
July	804	803	679	755
Aug.	932	859	686	713
Sept.	947	900	685	695
Oct.	....	905	...	647
Nov.	....	836	...	569
Dec.	....	749	...	553
Total	....	11,593		

*For sale. U. S. Bureau of the Census.

	Shipments 1961	Shipments 1960	Backlogs 1961	Backlogs 1960
Jan.	261.6	235.1	2,371.2	2,390.5
Feb.	260.2	270.9	2,357.4	2,473.8
Mar.	292.4	311.6	2,392.1	2,671.8
Apr.	318.7	322.7	2,377.5	2,713.4
May	365.0	320.1	2,457.8	2,528.2
June	361.2	374.2	2,414.7	2,507.5
July	286.9	338.9	2,517.1	2,489.8
Aug.	359.5	373.4	2,377.5	2,389.1
Sept.	326.2	363.9	2,729.3	2,325.6
Oct.	354.5	352.8	2,566.5	2,291.4
Nov.	....	324.7	.....	2,278.2
Dec.	....	276.9	.....	2,332.8
Total	....	3,865.2		

American Institute of Steel Construction.

Charts copyright, 1961, STEEL.

and began placing orders in early December. Thus, the increase in steel output noticed since the Thanksgiving week is expected to continue until the Christmas and New Year weeks, then fall back seasonally (or less). The fastest upturn since the end of the 1959 steel strike is expected to follow.

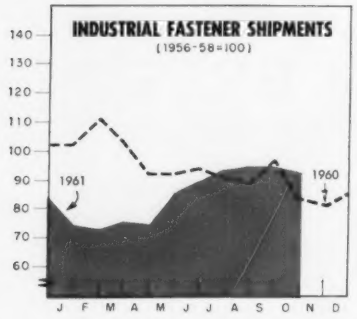
● **Seasonal Factors Balance**—As for the other elements of STEEL's production index, seasonal factors will tend to keep them in balance. Electricity output, as usual, will set a record in the pre-Christmas week when commercial and home use will be at its peak. But the gains will be moderated by the usual slowdown in railroad freight carloadings in the winter months.

So the outlook boils down to this: If steelmakers step up operations enough this month in anticipation of heavy first quarter demand, STEEL's index may gain enough to break the record 185. But even if it misses the mark, there is a good chance that the trend line will continue its climb after the holidays and start the new year at the highest point ever.

● **Translated into FRB**—In view of the traditional relationship between STEEL's index and that for total production tabulated by the Federal Reserve Board, it follows that a significant rise in the trend line (Page 67) will result in another gain for the government's barometer. The latest reading (October) of the FRB figure was 113 (1957 = 100). A gain of 1 or 2 points is indicated for November. So the December peak could well be the 116 so widely predicted earlier this year. If so, the average for 1961 will be 109, or 1 point above the 1960 record. (In September, STEEL's Panel of Economic Consultants forecast a level of 110 for the year.)

Pitt Forecasters See Gains

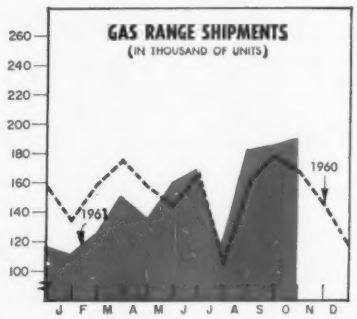
It is still fairly early in the forecasting season, but certain "standard" forecasts are already taking shape. At the Eighth Pitt Conference on Business Prospects, Walter Moore, director of commercial research for Jones & Laughlin Steel Corp., narrowed the predictions for steel output next year to 105 million to 115 million tons. A difference of 10 million tons, he declared, is not great, but it is the distribution of this production over the year that raises some controversy. Both the conservatives and the op-



(Seasonally adjusted)

	1961	1960	1959	1958*
Jan.	75	102	99	133
Feb.	74	111	105	117
Mar.	76	103	105	103
Apr.	75	92	119	102
May	86	92	119	111
June	90	94	129	120
July	94	91	112	133
Aug.	95	89	77	120
Sept.	95	97	92	141
Oct.	93	83	83	137
Nov.	...	81	80	134
Dec.	...	85	102	152
Avg	...	94	101	125

*1947-49 = 100.
Industrial Fasteners Institute.



Shipments—Units

	1961	1960	1959
Jan.	114,800	133,400	148,700
Feb.	124,800	159,300	152,400
Mar.	150,800	174,800	171,300
Apr.	136,000	156,500	165,800
May	161,500	145,500	160,400
June	167,200	166,500	171,000
July	114,400	105,700	143,800
Aug.	183,600	162,800	176,400
Sept.	185,800	178,600	210,500
Oct.	189,600*	169,000	195,000
Nov.	.....	144,400	159,900
Dec.	.....	117,800	157,100
Totals	.....	1,814,300	2,012,300

*Preliminary.
Gas Appliance Mfrs. Assn.

timists are looking for about 62 million tons in the first half, as metalworkers get inventories in shape for a possible steel strike, rising prices, or both. So the 10 million tons difference is concentrated in the second half.

Consumption is the big question. The conservatives expect at least 2 million more tons to go into inventories in the first half than do the optimists. The optimists (including Mr. Moore) see consumption of metalworking industries rising fast enough to limit the accumulation of stocks. "The optimistic group feels that since steel consumption will remain high in the third quarter (at least 18 million tons), this will partially offset the inventory reduction, and the traditional seasonal third quarter turndown will be only modest." If you believe that the economy will continue upward in the fourth quarter, then you should count on 110 million to 115 million tons of steel production next year, he claims. If you think the economy will soften in the fourth quarter, then you belong in the 105 million to 110 million forecast group.

Profitwise, the industry should be at a near record dollar volume next year, declared Phillip E. Albrecht, steel analyst for Merrill Lynch, Pierce, Fenner & Smith, New York. Assuming 79 million tons of finished steel (equivalent to 110 million tons of ingots) and a profit level equal to $12.50 a ton (the 1958-60 level as figured by the American Iron & Steel Institute for 96.5 per cent of the industry) profits would be about $950 million. But if profit per ton improves only 5 per cent (not unusual during an uptrend) net profit in 1962 could go up to $1.13 billion. The "ifs" in this forecast: 1. If there is no long steel strike. 2. If there is no major price increase. 3. If wage increases are held within the bounds of productivity.

For the copper industry, Mr. Albrecht sees a 5 to 10 per cent rise in demand, which could mean a 10 to 20 per cent rise in profits for the typical copper producer if: 1. The primary price holds at the 30 to 31 cent a pound level. 2. Production interruptions are intermittent or limited.

For aluminum producers, the outlook is not so cheerful. Profits will rise about the same percentage as shipments—perhaps 10 to 20 per cent. "There is no sign of an end to the competition which has caused such a sharp drop in unit profits in the last five years," he declared.

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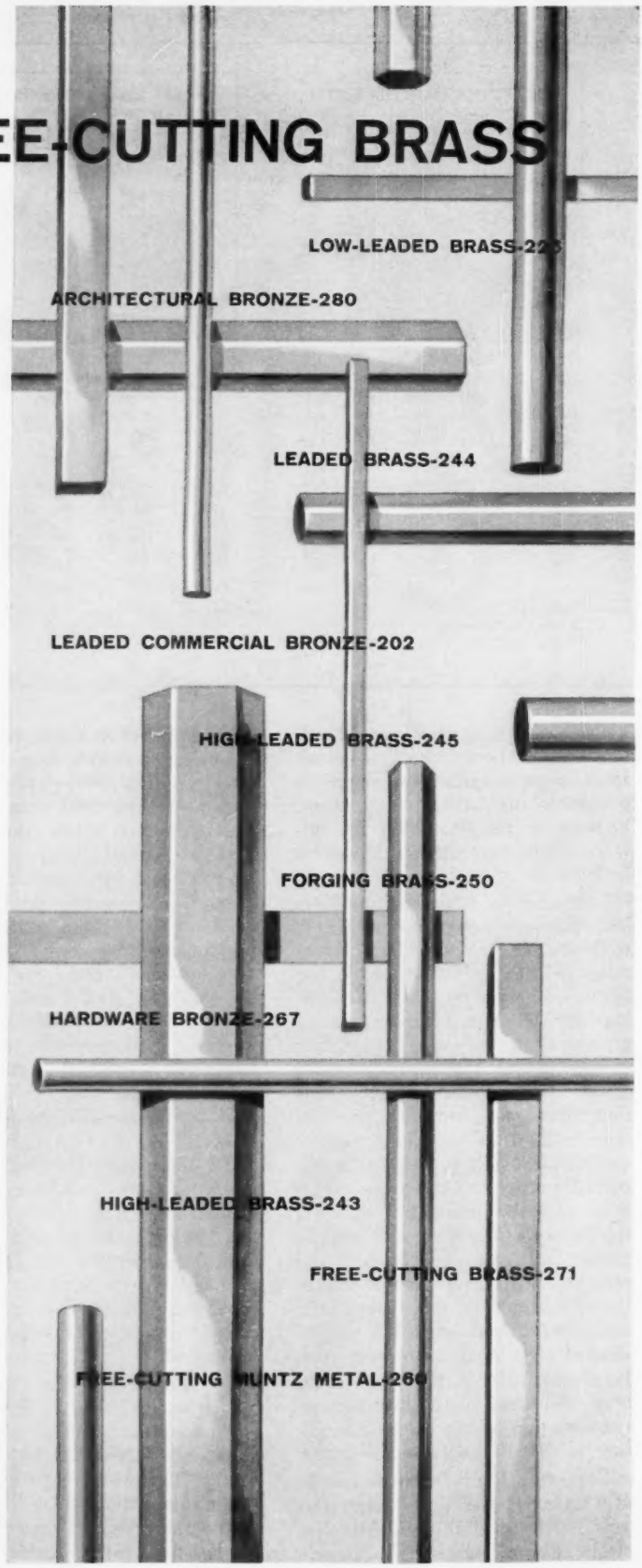

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Dytronics chief engineer

RUDOLPH SMITH
CF&I executive v. p.

ELLWARD L. LASKIN
Westing-Arc mfg. mgr.

S. W. Meyers, former assistant general manager of World Tool & Engineering Co., Minneapolis, joined **DeVlieg Machine Co.,** Royal Oak, Mich., as works manager.

Stefan W. Glogowski was appointed chief engineer for **Dytronics Inc.,** Rochester, Mich., subsidiary of Taylor Fibre Co. He was a project engineer, Metal Fabricating Div., DeVilbiss Co.

W. E. Korsan was made manager of marketing in the Industrial Equipment Div. of **Allis-Chalmers Mfg. Co.,** Milwaukee. **Paul W. Clark** was made manager-systems engineering for the division. Both are new posts.

W. Ben Flanigin fills the new post of manager of sales and marketing for **E. W. Bliss Co.,** Canton, Ohio, including its subsidiary, Gamewell Co. He was vice president of Gamewell. He will have headquarters in Bliss's general offices in Canton.

Rudolph Smith was elected executive vice president, **Colorado Fuel & Iron Corp.,** Denver. He was executive vice president in charge of operations, and previously works manager, Pueblo, Colo., steel works.

Robert R. Sharetts fills the new post of manager of Whirlclad Systems Engineering for **Polymer Processes Inc.,** Reading, Pa.

Allen-Sherman-Hoff Co., Wynnewood, Pa., division of A-S-H Industries Inc., named **Roy P. Spreter** vice president-sales; **F. W. Winkelman** vice president-engineering and service.

Howard H. Kelso was made chief engineer, **John A. Campbell** assistant chief engineer at the **Fairless Works,** Fairless Hills, Pa., U. S. Steel Corp. Mr. Kelso succeeds **Charles H. Good,** promoted and transferred to Pittsburgh headquarters of the corporation as assistant chief engineer-steel.

Ellward L. Laskin was named manager of manufacturing, Westing-Arc Dept., Buffalo, **Westinghouse Electric Corp.** He was manager of manufacturing for the Industrial Electronics Dept., Baltimore.

John F. Hines was named director of milling machine sales and federal government sales for the Machine Tool Div. of **Brown & Sharpe Mfg. Co.,** Providence, R. I. He was sales manager, Cutting Tool Div. **Ronald C. Smith** was made mid-Atlantic district sales manager.

Frank J. Graziano fills the new post of corporate director of operations at **Continental Copper & Steel Industries Inc.,** New York. He was vice president-manufacturing of Monarch Machine Tool Co.

James F. Jones, former group vice president, industrial products, of A. O. Smith Corp., was elected president of **Federal Sign & Signal Corp.,** Blue Island, Ill. **Sydney K. Schiff,** former president, continues

W. BEN FLANIGIN
Bliss sales-marketing mgr.

HOWARD H. KELSO
Fairless Wks. chief eng.

FRANK J. GRAZIANO
CCS operations director

JAMES F. JONES
Federal Sign & Signal pres.

ROY R. BUSH

P. C. KREUCH

Rockwell-Meter & Valve sales posts

PAUL C. ELY

TRUMAN H. KENNEDY

National Tube Div. executives

as chairman, a post he has held since 1946.

Roy R. Bush was made vice president-sales, Meter & Valve Divisions, **Rockwell Mfg. Co.**, Pittsburgh. **Thomas O. Carson** was made assistant vice president-sales; **Edward W. Wenrich** administrative assistant to Mr. Bush. **P. C. Kreuch**, vice president, in addition to direction of water and sewage product sales, valve actuator sales, and new product sales and government services, will handle a special engineering and sales assignment for the Meter & Valve Divisions.

Richard E. Rassel was made Detroit district sales manager, Press Div., **E. W. Bliss Co.** He succeeds **J. L. Chase**, made manager of container machinery sales.

E. P. Cunningham was appointed executive vice president-international operations for **Clearing Div.**, Chicago, U. S. Industries Inc. **E. J. Baumrucker** was appointed executive vice president-domestic operations.

Paul C. Ely was appointed vice president-operations, **National Tube Div.**, Pittsburgh, U. S. Steel Corp. He succeeds **Truman H. Kennedy**, who was made assistant to president. **William L. Fader** succeeds Mr. Ely as general manager-operations, and is succeeded as general superintendent of National Tube's Lorain, Ohio, Works by **Alvin J. Scheel. Robert L. Horn** replaces Mr. Scheel as assistant general superintendent.

John W. Hutchinson Jr. was made motive power market manager, **Exide Industrial Marketing Div.**, Philadelphia, Electric Storage Battery Co. He succeeds **O. L. Robertson**, now on special assignments on national sales accounts in the telephone field.

Eutectic Welding Alloys Corp., Flushing, N. Y., appointed **Guy A. dal Molin** manager of engineering; **Gordon E. Cossaboom** manager of product planning.

William P. Panny was elected executive vice president, **Pioneer Engineering & Mfg. Co.**, Detroit. He is in charge of the company's four divisions.

Edward C. Myers was appointed vice president of **United States Steel Corp.**, Pittsburgh, with special assignment in the office of the president preparatory to becoming vice president and assistant to the president Mar. 1 following retirement of **J. D. Darby**. Mr. Myers was vice president - personnel. **R. Heath Larry** and **W. L. Lohrentz** were appointed administrative vice presidents-personnel services.

George S. Ford was named vice president-purchasing; **Calvin C. Williamson** vice president-manufacturing at **Soule Steel Co.**, San Francisco.

William E. Quigley, comptroller, was elected vice president-comptroller of **Anaconda Co.**, New York.

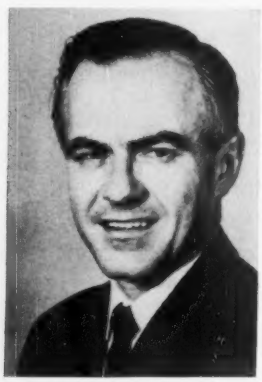
William McAvay, former general sales manager, was made vice pres-

E. P. CUNNINGHAM

E. J. BAUMRUCKER

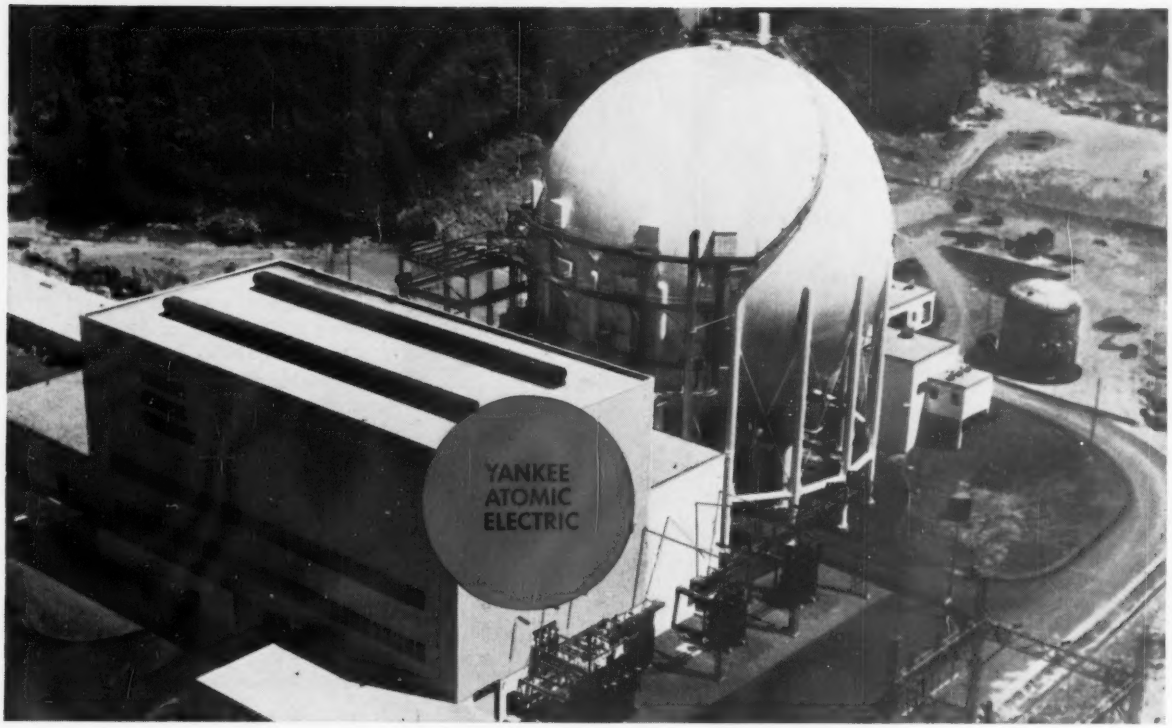
Clearing Div. executive vice presidents

GUY A. DAL MOLIN



GORDON E. COSSABOOM

Eutectic Welding Alloys appointments



ATLANTIC MEETS THE CHALLENGE
PROVIDES TOTAL LUBRICATION FOR ATOMIC POWER PLANT

This new, 43-million-dollar atomic power plant, which is owned and operated by Yankee Atomic Electric Company, generates 150,000 kilowatts of electricity from Rowe, Massachusetts.

It is lubricated exclusively by Atlantic products.

Atomic power is a relatively new phenomenon to civilian life. When the time came to make lubrication recommendations for Yankee Atomic's plant, Atlantic lubrication engineers could rely only slightly on past experience with normal, steam-electrical generating plants.

It is Atlantic's policy, instead of employing a standard "by the book" lubricating procedure, to make thorough, practical surveys of all areas to be lubricated.

For Yankee Atomic, two Atlantic engineers made the field check. After inspecting each piece of equipment carefully, they took the time to determine the radioactive resistance of each Atlantic lubricant—in order to make the perfect recommendation for the "hot" areas in the plant.

They finally discovered it would be possible to cover the entire plant with the use of only five high-quality, multi-purpose greases and oils. This would save Yankee Atomic money, storage and inventory.

Thus, owing to our policy of carefully analyzing the practical aspects of a working plant rather than simply following routine, we were able to offer Yankee Atomic the best possible lubrication service . . . and win the job.

Atlantic has a full line of excellent lubricants. But, more important, we can show you how to apply them with the best results possible. Let one of our sales engineers help you with your lubrication problem.

Providence, Rhode Island, 430 Hospital Trust Building • Syracuse, New York, Salina and Genesee Sts.
Pittsburgh, Pennsylvania, Chamber of Commerce Building • Charlotte, North Carolina, 1112 South Boulevard

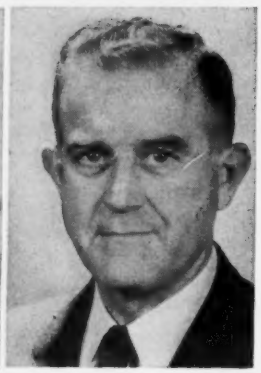
ATLANTIC

THE ATLANTIC REFINING COMPANY

260 South Broad Street, Philadelphia 1, Pennsylvania

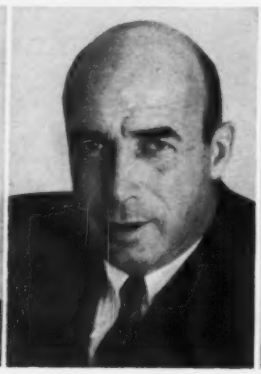
DAVID I. DILWORTH JR.
Latrobe Steel appointment

JULIUS ZINN
Johnson & Hoffman v. p.



COL. ARTHUR R. CYR
Rockwell-Canadian exec.

PATRICK ADAMSON
Wheel Trueing v. p.



W. T. INGRAM
Reynolds Metals v. p.

FREDERIC L. YARRINGTON JR.
Advanced Vacuum Prod. Sales

ROBERT J. MULLENBACH
Electric Machinery v. p.

JOSEPH W. MORGAN
Hyster div. sales mgr.

G. FREDERICK WHEELWRIGHT
De Laval Separator post

ident-sales, **Burgmaster Corp.**, Gardena, Calif.

Robert J. Mullenbach was named vice president of **Electric Machinery Mfg. Co.**, Minneapolis. He continues as general manager of the E-M Control Div.

Robert L. Dicke was named president and general manager, **Farrell Mfg. Co.**, Joliet, Ill.

Joseph W. Morgan was named domestic sales manager, Tractor Equipment Div., **Hyster Co.**, Portland, Oreg. **Graydon Broms** was made assistant sales manager for the division.

G. Frederick Wheelwright was elected vice president-sales, Industrial Div., **De Laval Separator Co.**, Poughkeepsie, N. Y. He was division general sales manager.

David I. Dilworth Jr. was appointed a staff officer, reporting directly to the president of **Latrobe Steel Co.**, Latrobe, Pa. He will act on special assignment both in this country and abroad. He was vice president and assistant to the president of Braeburn Alloy Steel Div., Continental Copper & Steel Industries Inc.

Julius Zinn was elected vice president of **Johnson & Hoffman Mfg. Corp.**, Mineola, N. Y. He is responsible for manufacturing at the main plant in Mineola, and at the Brooklyn Div., Brooklyn, N. Y. Johnson & Hoffman is an affiliate of Superior Tube Co.

Col. Arthur R. Cyr, former commanding officer, Frankfort Arsenal, Philadelphia, joined Rockwell Mfg. Co. as executive vice president, **Rockwell Mfg. Co. of Canada Ltd.** He will have headquarters at Guelph, Ont.

Patrick Adamson was elected a vice president, **Wheel Trueing Tool Co.**, Detroit. Active in the company's diamond drill bit manufacturing and marketing operations in the mining and oil field industries for the last 20 years, he continues some of those responsibilities.

W. T. Ingram, general sales manager, was elected a vice president of **Reynolds Metals Co.**, Richmond, Va.

Frederic L. Yarrington Jr. was promoted to sales manager of **Advanced Vacuum Products Inc.**, Stamford, Conn. He is in charge of marketing the ceramic-to-metal assemblies manufactured by Advac, subsidiary of Glass-Tite Industries Inc.

OBITUARIES...

Peter Payson, 63, assistant director of research for **Crucible Steel Co. of America,** Pittsburgh, died Nov. 26.

William I. LeVan, 51, director of reliability, **Aerospace-Rockets Div.,** Buffalo, Bell Aerosystems Co., died Nov. 22.

James Baines, 61, production superintendent at the Scranton, Pa., plant of **Murray Corp. of America,** died Nov. 25.

MAIL the coupon for latest Safety Switch Bulletin

Square D Company, Dept. SA-116
1601 Mercer Road, Lexington, Kentucky

Please send me your latest SAFETY SWITCH BULLETIN

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

THE ONLY COMPLETELY SAFE SAFETY SWITCH HAS VISIBLE BLADES!

Square D gives you Safety you can See!

• The men who pull the switches will tell you what can happen when a switch, *believed* to be open —*isn't*. A lot of things can happen—and every one of them is bad. Personnel safety is in jeopardy. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

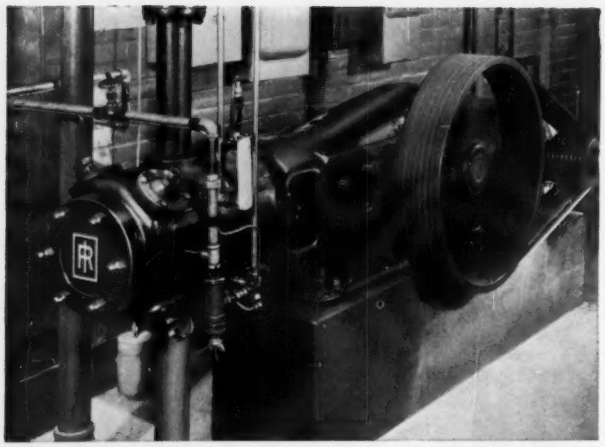
Doesn't it make sense to insist on **V**isible **B**lade construction which gives you a road block against any of those possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages? Evidently it does, because *Square D switches have never been out of first place in more than 50 years!*

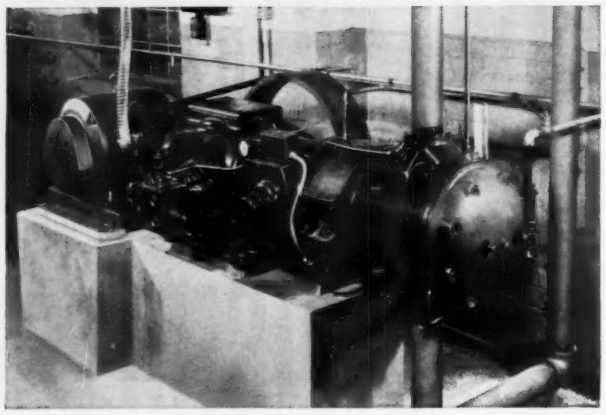
They cost no more...why settle for less?

SQUARE D COMPANY

wherever electricity is distributed and controlled

Top: this 20-hp Ingersoll-Rand ES air compressor has served the G. E. Prentice Manufacturing Company for 12 years with no part replacements. Bottom: new 25-hp ESH compressor, added for increased capacity.





IN I-R COMPRESSORS,

TIME TELLS

THE DIFFERENCE

12 years as full-load compressor...

43,560 HOURS

with no parts replaced!

In 1947, the G. E. Prentice Manufacturing Company, of Kensington, Conn., installed an Ingersoll-Rand ES compressor to supply the air power for production of metal stampings. Since then, the compressor has been on duty through every shift, and has totalled more than 43,560 hours with no part replacements on valves, cylinder, or running gear!

The Channel Valves were inspected twice a year and cleaned when necessary, but no parts were replaced. The cylinder bore and rings are still in perfect condition.

Recently, a new Ingersoll-Rand ESH compressor was added to take care of increased capacity demand. The ESH is the successor to the ES, and offers many new *extra-value* features, such as full-floating aluminum bearings which never need adjustment, sealed frame which keeps out dirt (the major cause of wear), complete filtered pressure lubrication, and self-adjusting metallic packing. And of course, Ingersoll-Rand's famous air-cushioned Channel Valves with reversible seat plates.

Ingersoll-Rand offers the most complete line of compressors, in reciprocating, centrifugal, rotary and ejector types. There are units from ½ to 20,000 hp, for pressures from one micron to 35,000 psi. Your I-R man can give valuable help with your compression needs – call him today.

Ingersoll-Rand

11 Broadway, New York 4, N.Y.

124-A-1

The World's Most Comprehensive Compressor Experience

Pittsburgh Steel Awards Contracts for Expansion

PITTSBURGH STEEL CO., Pittsburgh, has awarded initial contracts under its $44 million capital improvement program. Awards for engineering and production facilities involve $3,770,000. In addition, $2.8 million has been invested in Wabush Iron Co. Ltd., a group of iron and steel producers developing a multimillion dollar iron ore property in Newfoundland, Canada.

• **Oxygen Converters** — The engineering contract for installation of two, top blown, oxygen converters and related auxiliary equipment at the Monessen (Pa.) Works went to H. K. Ferguson Co., Cleveland. Engineering work will require about seven months; equipment orders will be placed as each phase is completed.

When completed in late 1963, the steelmaking plant's ingot output capability will be three-quarters that of the company's present open hearth furnaces.

• **Annealing Dept. Foundations**—Donora Construction Co., Donora, Pa., was awarded the contract for foundations to be laid adjacent to existing Sheet Div. annealing facilities at the Allenport, (Pa.) Works. The contract includes foundations for the extension of the present Annealing Dept., all floors, and furnace bases. Work is to be completed by Apr. 1.

Expansion of annealing facilities will increase Pittsburgh Steel's cold rolled sheet capacity by 40 per cent. "Getting our annealing capacity in place by mid-1962 will put us in a position to take full advantage of a sheet market which continues to grow year by year," says Allison R. Maxwell Jr., president. "We have taken the first step in our program designed to reduce our raw material and steelmaking costs, as well as to increase productivity and our profit position."

• **Building Contract**—Work on the Annealing Dept. building will begin in mid-February and is scheduled for completion June 1, 1962. The contract was awarded to Pittsburgh Bridge & Iron Works, Pittsburgh, and includes supply, fabrication, and erection of about 1250 tons of structural steel, connecting the old and new buildings, and relocation of transfer car tracks.

• **Siding & Roofing**—The contract for this work went to H. H. Robertson of Pittsburgh and is expected to be completed by July 1, 1962.

• **Equipment**—Annealing furnaces, auxiliary equipment, and installation contracts were let as one and went to General Electric Co., Schenectady, N. Y. GE's Furnace Div., Indianapolis, will fulfill the contract, which includes 13 furnaces (batch annealing type), inner covers, power supply, motors, fans, and controls. Target date for completion is July 1, 1962.

• **Miscellaneous** — Other smaller contracts were given to Victor R. Browning Co., Cleveland, for an overhead coil crane, and to Elwell-Parker Co., Cleveland, for material handling equipment.

Foreign Agreements Made

Several agreements between American and foreign firms have been announced recently.

Morgan Engineering Co., Alliance, Ohio, has concluded a licensing agreement with Pintsch Bamag A.G., Cologne, West Germany, to manufacture for sale in the U. S. and Latin America, basic oxygen converter parts, accessories, and related equipment for steel plants.

Mitsubishi Atomic Power Industries Inc., Tokyo, Japan, will manufacture nuclear reactors and their associated auxiliary equipment under a license and technical assistance agreement announced by Westinghouse Electric International Co., Pittsburgh.

Bendix Corp., Detroit, has acquired a one-third interest in Nieberding & Co. G.m.b.H., Neuss, Germany, a manufacturer of pneumatic gaging for industry. Licensing agreements also were concluded whereby the German company will manufacture the complete line of precision air gages of Sheffield Corp., Dayton, Ohio, a Bendix subsidiary. Nieberding will handle sales of Sheffield's precision measurement instruments, automatic gaging, and assembly machines and machine tools in Germany, Austria, and Denmark.

Electric Autolite Co., Toledo, Ohio, has arranged for the manufacture of a complete Prestolite line of automotive wire and cable by La Seneffoise S.A., Seneffe, Belgium. The Toledo firm has also formed a company in India, Prestolite of India Ltd., to produce a wide range of automotive electrical components and subassemblies.

Cincinnati Milling Extends Meta-Dynamics Div.

Cincinnati Milling Machine Co., Cincinnati, transferred the Electrical Machining Dept. of the Milling Machine Div. to the Meta-Dynamics Div. which produces metal forming and heating machines. The products complement those of the Electrical Machining Dept. Combined activities of the Meta-Dynamics Div. are under the direction of C. Bruce Minturn. Howard W. Carlisle is manager of metal forming, Meta-Dynamics Div.

New Plant for Long-Lok

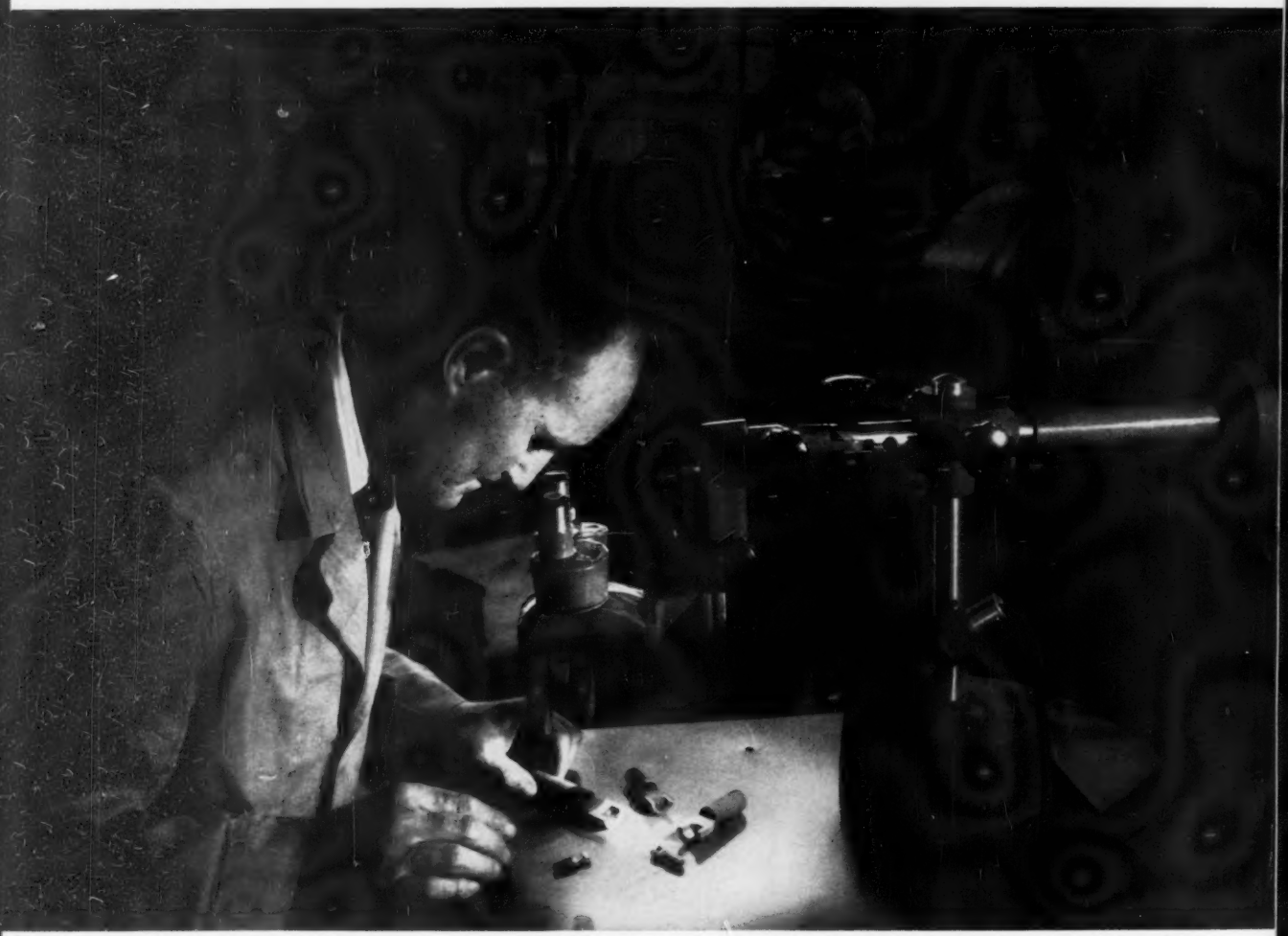
Long-Lok Corp., Los Angeles, formed a new division, Long-Lok Midwestern Corp., with offices and plant at 7036 Poplar Lane, Cincinnati, Ohio. The firm makes self-locking bolts and screws. J. D. Kauffman is general manager of the new company.

Ipsen Forms New Division

Ipsen Industries Inc., Rockford, Ill., has inaugurated a program designed to step up technological research into the fabrication and processing of ultrahigh temperature materials. A new Ipsen subsidiary, Refractory Metals Div., will occupy a 19,000 sq ft facility at 715 S. Main

(*Please turn to Page* 80)

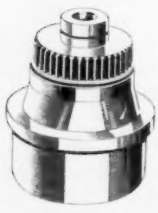
SPS quality control proves



Acid etch and magnetic particle tests are performed by SPS quality control experts like Rouse Roberts, shown here examining grain flow of the metal in a socket screw cross section.

INDUSTRIAL FASTENERS like this UNBRAKO Socket Head Cap Screw are produced to a dynamic reliability standard as a result of SPS research. The SPS line includes a limitless variety of self-locking screws, locknuts and precision fasteners for everything from massive machinery to the most minute products.

AIRCRAFT/MISSILE FASTENERS like this bolt are produced to ultra-high performance standards at SPS. Today's lightest, strongest fasteners in standard and special designs are products of SPS. Research and development work includes titanium, beryllium and other lightweight, high-strength exotic metals.



NUCLEAR COMPONENTS like this cap for a core housing are held to almost unbelievable dimensional tolerances. The nuclear energy field depends on SPS for threaded fasteners, control rod drive mechanisms, motor tubes, core components, instrumentation housings and many other essential parts.

reliability is more than skin deep

A hundred times a day, Rouse Roberts, "Mr. Reliability", peers through his microscope to check grain flow in fasteners.

All around his quality control station, huge machines form UNBRAKO Socket Head Cap Screws.

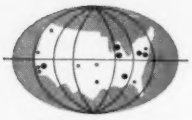
Before and during every production run, fasteners from each machine must pass his tests. He cuts a cross section of the cap screw head . . . etches it with acid . . . and examines it under a microscope. Special lighting reveals the grain flow of the metal.

Flow lines that bend around the fillet with no interruptions indicate a strong, reliable, forged head. Satisfied with the grain flow, "Mr. Reliability" then runs a magnetic particle test to reveal hidden cracks or flaws.

Just three minutes cover both tests. At any time, a signal from Rouse can shut down a machine until its production once again meets SPS reliability standards. And there is a "Mr. Reliability" in every SPS production department.

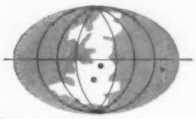
This is the kind of painstaking, quality control that has made SPS today's leading producer of high reliability fasteners for the demanding '60's.

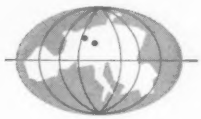
The new 18-page booklet, "Evolution in Socket Screw Design", will explain this development to you in much greater detail. Write for a copy now.



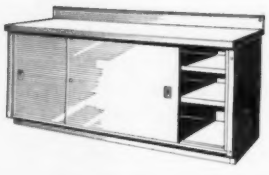
SPS

where reliability replaces probability





STANDARD PRESSED STEEL CO., Jenkintown, Pa., Santa Ana, Calif. • The Cleveland Cap Screw Company, Cleveland, O. • Columbia Steel Equipment Div., Fort Washington, Pa. • International Electronic Industries, Inc., Nashville, Tenn. • National Machine Products Div., Utica, Mich. • Standco Canada, Ltd., Toronto, Canada • Unbrako Socket Screw Co., Limited, Coventry and Sheffield, England Unbrako Schrauben GmbH, Dusseldorf and Koblenz, W. Germany.



SHOP EQUIPMENT for industry and schools is made to the same superior quality standards as other SPS products. The Hallowell line offers broad coverage of standard and special needs in work benches, shelving, and similar equipment. Ruggedness and space efficiency are well identified with Hallowell.

OFFICE FURNITURE like this handsome Columbia Nine-to-Five unit sets an office apart with distinctive styling and color combinations. The complete line includes efficiently designed, durable steel office furniture, plus special units, a wide choice of smart chairs, filing cabinets and accessories.

CAPACITORS FOR ELECTRONICS bearing the IEI trademark are widely used for subminiature circuitry and transistorized applications. This SPS company makes both aluminum and tantalum capacitors, including the lightest and smallest per given capacitance in the industry, to the highest quality standards.

SAFE, RELIABLE POSITIVE CONTROL

Convenience, positive control and protection for the operator are provided by the pistol-grip, push-button control station of the Coffing Quik-Lift electric hoist.

Loads can be raised or lowered while pulling a trolley mounted hoist since a strain cable is incorporated in the control cord. The control station is made of non-conducting, impact resistant plastic and the 115 volts at the station plus the interlocked push buttons make for safe operation. The V-type brake assures positive control of loads. Housing is of strong but light aluminum which makes for portability.

Ask your distributor about the twenty JF models with capacities ranging from ¼ to 2 tons or write for Bulletin ADH-65BB.

COFFING HOISTS

DUFF-NORTON COMPANY

Four Gateway Center, Pittsburgh 22, Pennsylvania

COFFING HOISTS
Ratchet Lever • Air
Hand Chain • Electric

DUFF-NORTON

DUFF-NORTON JACKS
Ratchet • Screw
Hydraulic • Worm Gear

(*Concluded from Page 77*)

St., Rockford, housing apparatus relative to the production of refractory metal structures, thermal coatings, and ceramic components for aircraft and missile applications. C. W. Brunstetter, general manager, is supervising the installation.

Extruder Enlarges Plant

General Extrusions Inc. has launched a $250,000 expansion of its plant on Lake Park Road, Youngstown. A $100,000 building will boost the firm's production area by about 45 per cent. It will house the firm's enlarged anodizing, painting, and finishing departments, as well as the packaging and shipping sections. An additional $150,000 will be spent for new equipment and machinery.

Battery Plant Enlarged

Gould-National Batteries Inc., St. Paul, is enlarging the building and production facilities at its nickel cadmium battery plant on Vandalia Street. Production facilities are being tripled.

Equipment Maker Expands

Rapids Machinery Co., Marion, Iowa, has completed additional manufacturing and warehouse facilities. The firm makes horizontal mixing equipment.

NEW PLANTS

Semiconductor Div., Syntron Co., transferred its production equipment into the $500,000, 16,000 sq ft, semiconductor plant at Homer City, Pa. Offices, laboratories, and other supporting activities remain in the adjacent headquarters building. The division produces selenium rectifiers and stacks, selenium cartridge rectifiers, and silicon diodes and stacks.

Sterling Faucet Canada Ltd. will produce chrome plated, plumbing brass goods in its 17,000 sq ft plant at Oakville, Ont. Arnold McKay is general manager.

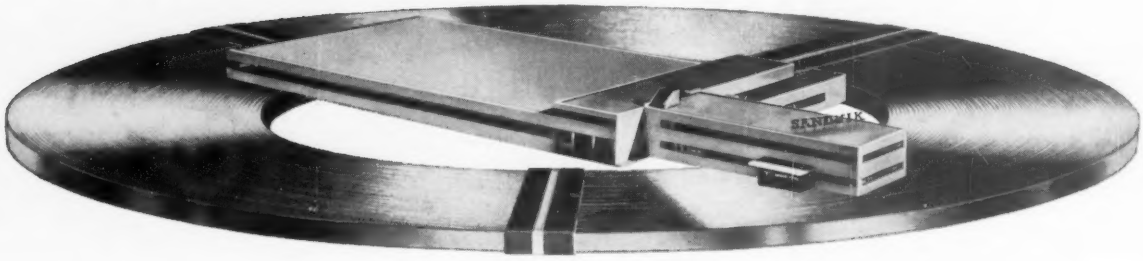
Grove Valve & Regulator Co., Oakland, Calif., has started full scale production at its valve manu-

SANDVIK

THRIVES ON THE TOUGHEST SPRING STEEL APPLICATIONS

— because Sandvik is a specialist in spring steel — concentrating on specific physical properties, exceptional fatigue life, accurate and uniform flatness, straightness, gauge, width and finish.

Ask your nearest Sandvik office for further information or technical assistance.



For up to 40 years SANDVIK Specialty Steels have been used successfully for— Compressor Valves • Piston Ring Springs • Band Saws • Doctor Blades • Clock and Watch Springs • Vibrator Reeds • Shock Absorbers • Razor Blades Surgical and Special Knives • Camera Shutters • Textile Sinkers and Needles • Conveyor Belts • Recoil Springs for Power Saws, Mowers, Outboard Motors, Telephones, etc. • Parking Meters Fuse Mechanisms • Vending Machines • Electronic Components And a wide variety of other Spring Steel Functions.

SANDVIK STEEL, INC.

1702 Nevins Road, Fair Lawn, N. J.
SWarthmore 7-6200* N.Y.C. ALgonquin 5-2200

Branch Offices: Cleveland • Detroit • Skokie, Ill.
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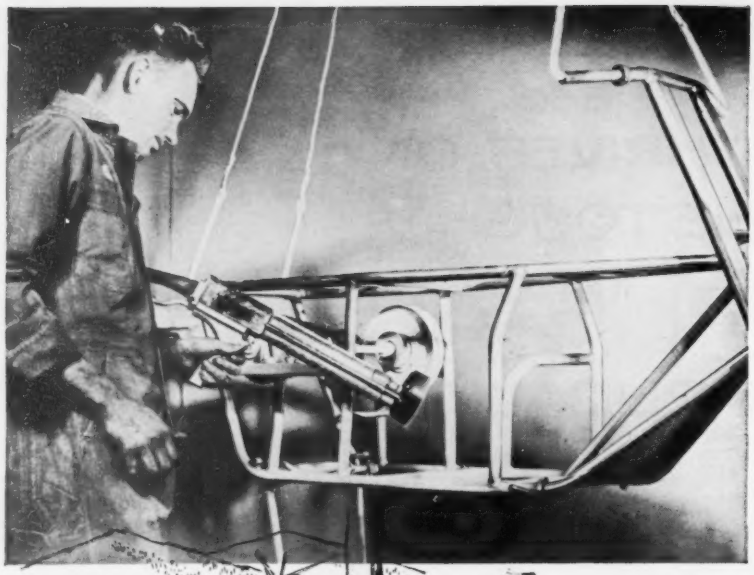
SANDVIK CANADIAN LTD., P.O. Drawer 1335, Sta. O, Montreal 9, P.Q.
Works: Sandviken, Sweden

SS-245



RANSBURG
Hand Gun Cuts Paint
Costs 35%—Painting Time
25% Over Former Flo-Coat in the
Production of **TOTE GOTE** Cycles

Continually searching for better and faster manufacturing methods, the Bonham Corporation, Provo, Utah, switched from flo-coating to Ransburg Electrostatic hand spray to paint their Tote Gotes. The Tote Gote is an "off-highway" cycle, especially popular with hunters and fishermen who use it to travel over rough and rugged terrain not readily accessible by highways and roads.

Now, with electrostatic spray painting, Bonham is getting an improved uniform coating . . . a 35% savings in paint cost . . . and painting time is cut 25%. And this over flo-coat!

The predominately tubular construction of the Tote Gote makes it particularly adaptable for painting with the Ransburg No. 2 Process Hand Gun. That's because the "wrap-around" feature of electrostatic painting covers all such areas from one side only.

NO REASON WHY YOU CAN'T DO IT TOO

See how the Ransburg Electrostatic Hand Gun can save time . . . paint . . . and cut costs in YOUR finishing department. Or, if your production justifies, it will pay you to investigate Ransburg's automatic electrostatic spray painting equipment. Send for our No. 2 Process brochure which cites numerous examples of modern production painting in both large and small plants.

RANSBURG

RANSBURG Electro-Coating Corp.
Box 23122, Indianapolis 23, Indiana

Affiliates in AUSTRALIA • AUSTRIA • BELGIUM • BRAZIL • DENMARK • ENGLAND • FRANCE • FINLAND GERMANY • HOLLAND • INDIA • IRELAND • ITALY • NEW ZEALAND • NORWAY • PAKISTAN • SOUTH AFRICA SPAIN • SWEDEN and SWITZERLAND

facturing plant near Mexico City, Mexico. The firm is a subsidiary of Walworth Co., New York. The new facility is under operation of Grove de Mexico S. A., a subsidiary.

Alloy Tube Div., Union, N. J., Carpenter Steel Co., opened a Philadelphia branch warehouse at Ft. Washington, Pa. Available from stock are welded and seamless tubing and pipe, valves, and fittings. R. F. Henley is branch manager.

Applied Thermal Product Ltd. has been organized to operate a plant at 33 Milvan Dr., Toronto, Ont. The firm fabricates industrial gas burning equipment, dust and control systems, infrared area heaters, and packaged warm air space heaters.

Arkas Tool & Die Co. has started manufacturing in a 1500 sq ft building at 159 A Lansdowne Ave., Toronto, Ont. The newly formed firm does general and precision machining.

NEW ADDRESSES

Accurate Metal Products Co. (sheet metal work) moved to larger quarters (10,000 sq ft) at 1101 S. Streeper St., Baltimore, Md.

Greenwood Engineering Co. Inc., manufacturer of corrugated container machinery, has discontinued operations in Baltimore and has transferred machinery and equipment to its parent company's (Samuel M. Langston Co.) headquarters in Camden, N. J.

Hancock Telecontrol Corp. transferred its manufacturing facilities from Jackson, Mich., to 143 Sound Beach Ave., Old Greenwich, Conn. Its executive and sales offices are at 320 Park Ave., New York.

Rotaflex of Canada Ltd. moved to 609 King St. W., Toronto, Ont. The firm is an associate of Rotaflex International of Switzerland. Rotaflex makes incandescent lighting fixtures. Addition of new equipment in the enlarged quarters permits a doubling of productive capacity and allows the firm to introduce a wider range of products, including metal

NEW DELIVERY SYSTEM CUTS GREASE-HANDLING COSTS

The new Humble grease truck shown above increases the speed and efficiency of bulk grease delivery, and makes possible added savings in storage and handling of lubricants within your plant. The possibility of in-plant grease contamination is virtually eliminated. It's another example of our constant efforts to bring you better products and service—whether you use a can or a carload.

As the diagram indicates, the specially designed insulated trailer body carries three cylindrical canisters, each holding about 10,500 pounds of grease. These compartments are separately filled and emptied—so that up to three different types of grease can be handled without intermixing.

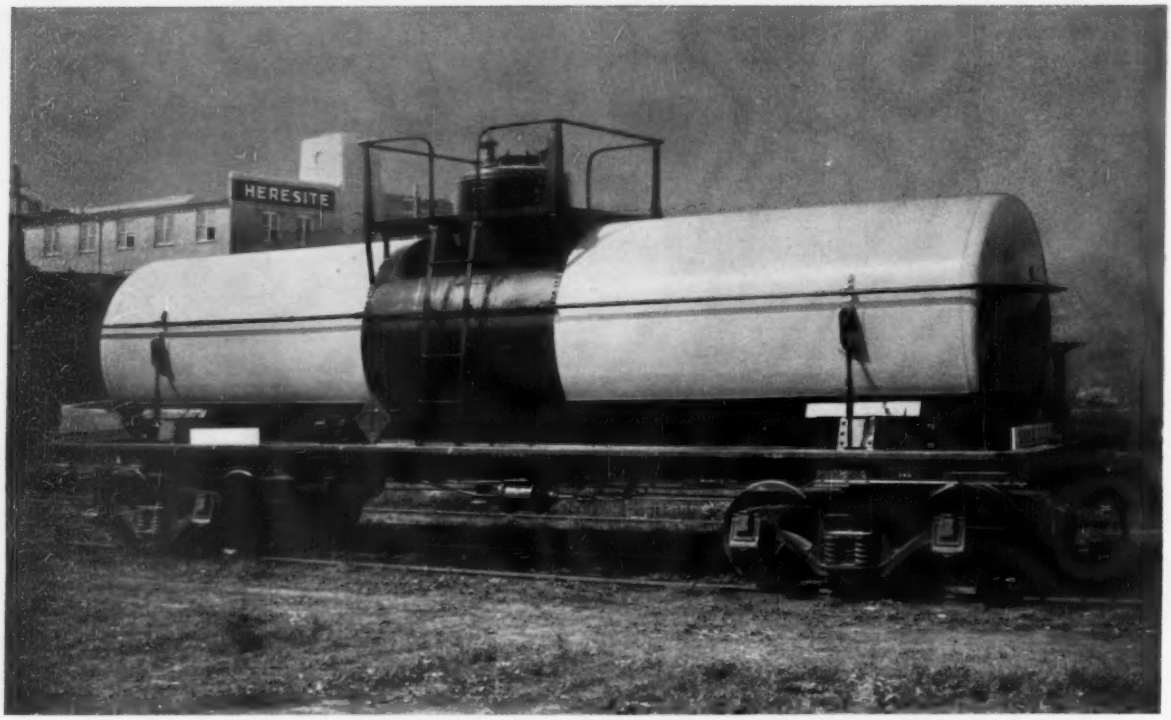
Your Humble Representative, backed by our conveniently located Sales Service Laboratories, can help you improve your lubrication practices. Contact him, or write us at 15 W. 51st St., N.Y. 19, N.Y.

HUMBLE OIL & REFINING COMPANY Esso

HERESITE

REG. U. S. PAT. OFFICE

TANK CARS LINED WITH HERESITE FOR HIGH RESISTANCE AND EASE OF CLEANING



Since 1947 more than 3,000 railroad tank cars have been lined with HERESITE pure phenolic resinous coatings. These tank cars were used for transportation of corrosive chemicals and the majority of them for sulphuric acid transportation. In general this coating was of a dark brown color. Now there also are light colored HERESITE coatings available for the transportation of food products. These colors are cream color, aluminum, and yellow. The colored coatings have almost the same resistance as the original Heresite P-403 lining which is used exclusively for transportation of corrosive chemicals.

These coatings are approved for use with food products.

HERESITE & CHEMICAL COMPANY — **MANITOWOC, WIS.**

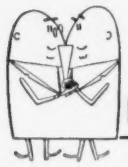
——— MAIN PLANT AND OFFICE ———

GENERAL COATING, INC. — **WOODBRIDGE, N. J.**

——— EASTERN SUBSIDIARY ———

Canada: Dominion Rubber Co., Ltd. — ***Montreal, Quebec***

display lighting and decorative waste baskets.



CONSOLIDATIONS

Anaconda American Brass Co., New York, purchased **Metal Hoses Inc.**, Los Angeles, manufacturer of flexible metal hose assemblies and related products.

Eriez Mfg. Co., Erie, Pa., acquired **Magnetic Engineering & Mfg. Co.**, Clifton, N. J. The purchase adds a complete electromagnet line to the Eriez line of permanent magnetic equipment. Memco products include electromagnetic equipment for ore separation, lifting magnets for steel and scrap handling, wet and dry beneficiation, sweepers for road and other industrial jobs. James Ferris continues as president of the Memco Div. of Eriez Mfg.

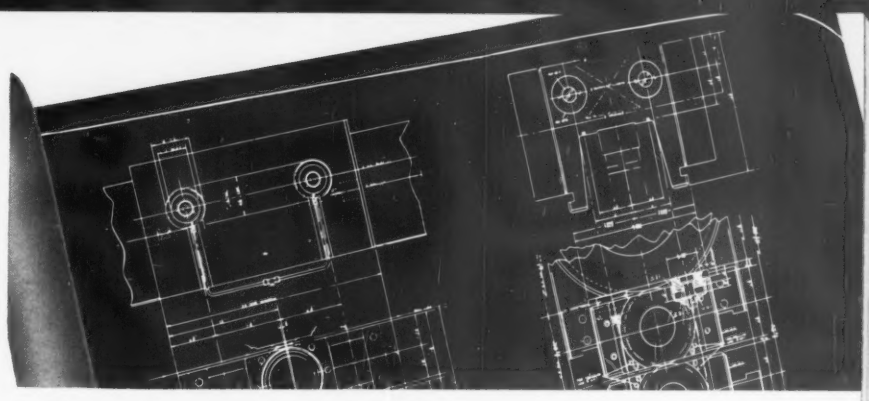
Vulcan Materials Co., Birmingham, purchased **Kolker Chemical Corp.**, Newark, N. J., and will operate the property as a wholly owned subsidiary in close association with Vulcan's Frontier Chemical Co. division. Kolker owns a chlorine-caustic plant and extensive facilities for the production of chlorinated products, methyl bromide, and benzoic acid.

Nopco Chemical Canada Ltd., London, Ont., purchased **Canadian Aniline & Extract Co. Ltd.**, Hamilton, Ont., and will operate the firm as an independent subsidiary. Officers of Canadian Aniline include: President, H. A. Batley; vice president-operations, Fred E. Brown.

Nasco Sales & Service Inc., Birmingham, purchased **Precision Welding Products Inc.**, Chattanooga, Tenn., and has moved the entire manufacturing operation to Birmingham. Precision makes chipping hammers for use in welding.

Laminated Shim Co. Inc., Glenbrook, Conn., acquired **Lang Tool & Mfg. Co.**, Glendale, Calif. The Lang plant will continue to make electric motor, generator, and transformer laminations and will continue to serve as a prime supplier

(*Please turn to Page* 88)



Blueprint of a new process

by "YOUNGSTOWN"

One of Many Major Developments for Industry during 75 YEARS of Service

Have you heard about Work Roll Shaping? It's a unique method for assuring uniform flatness of steel strip. Reports from users of installations already in operation indicate remarkable results. This is just one of the recent "Youngstown" developments which improve rolling mill operations. Complete information will be furnished, without obligation, on any of the following:

- *Hydraulic Work Roll Shape Control*
  Improves the quality of strip—economically
- *Automatic, Heavy Duty, Contour Roll Lathes*
  Modern design for templet or numerical control
- *New Carriage-Type Stretcher Levelers*
  Sizes from 10,000# to 4,000,000#. Fast, efficient
- *500 fpm—81" Sheet Scrubber Line*
  Cleans sheets up to 76" wide and .250" thick
- *New Rotary-Type Plate Scrap Chopper*
  Unique reciprocating design prolongs knife life
- *Coil Processors and Scale Breakers*
  New concept of coil processing and scale breaking

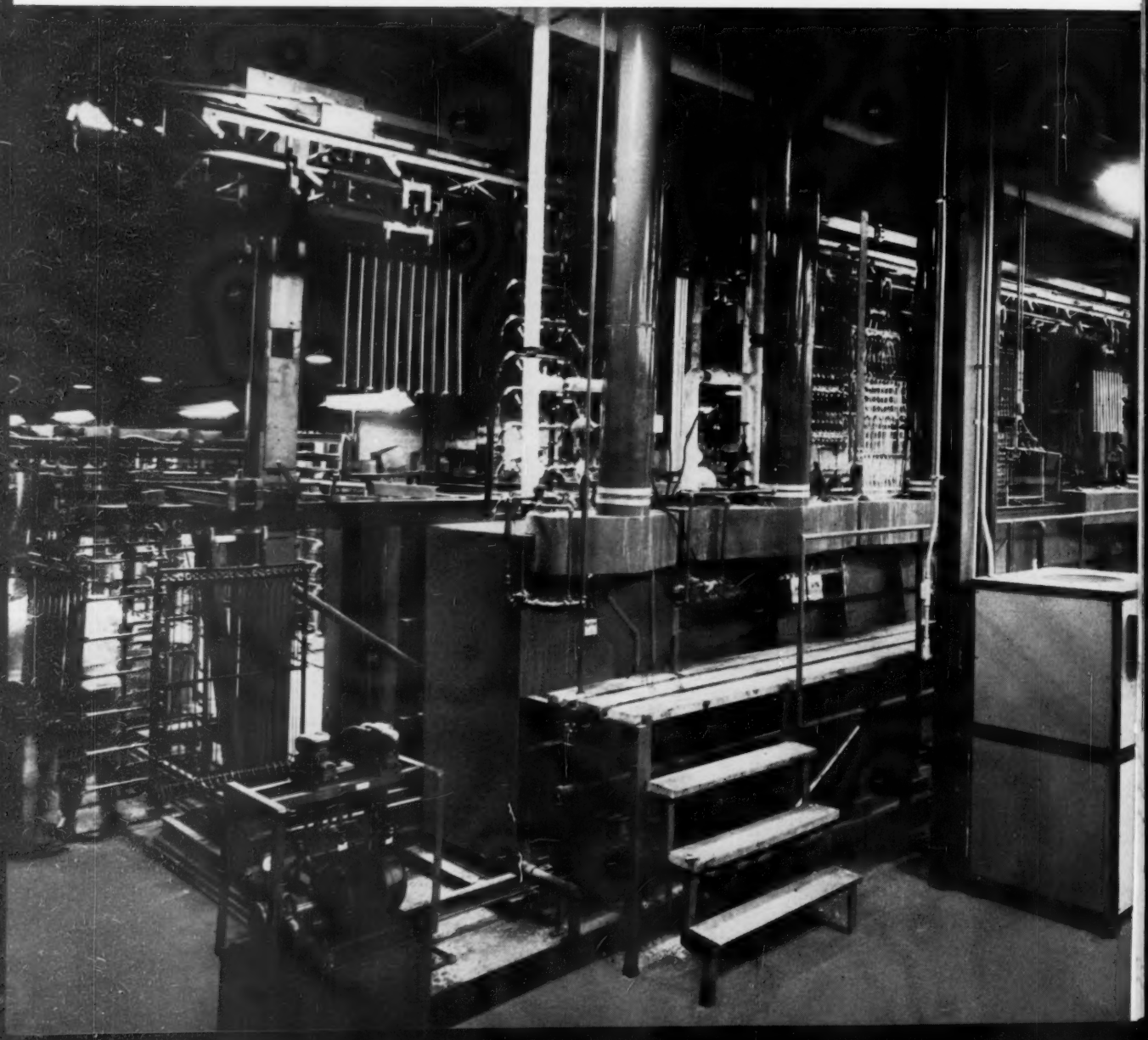
Other recent contracts range from complete turnkey installations to auxiliary components. Whatever the need—large or small—you benefit from "Youngstown" experience.

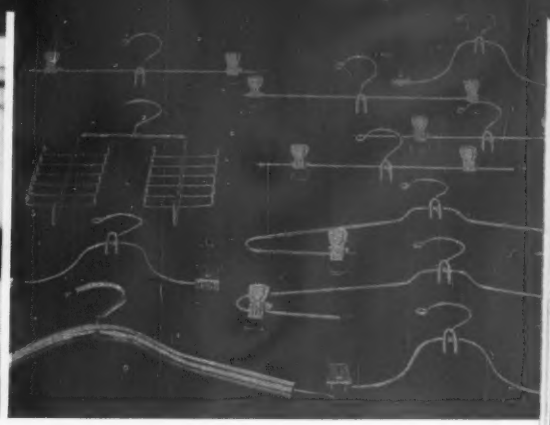
THE YOUNGSTOWN FOUNDRY & MACHINE CO. 75th ANNIVERSARY SERVING INDUSTRY SINCE 1886

The Youngstown Foundry & Machine Co.

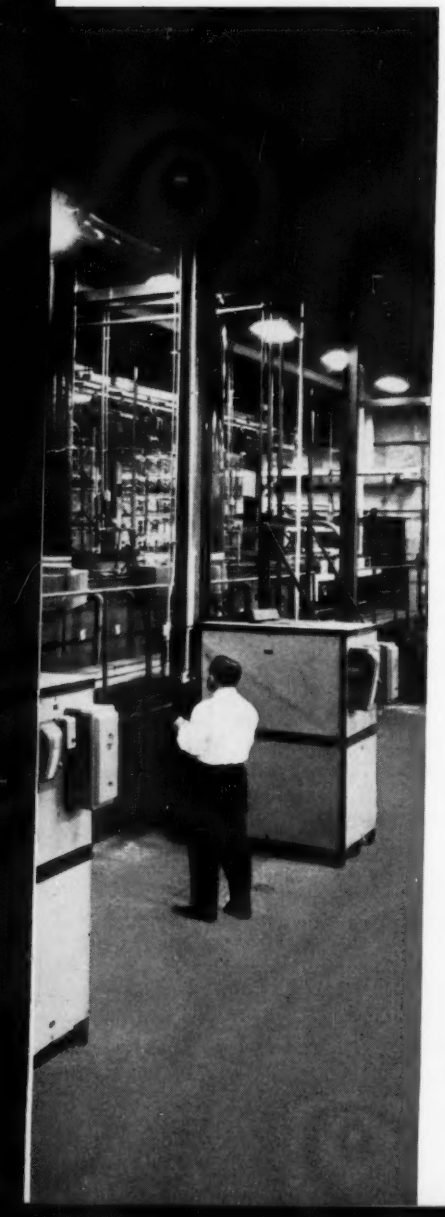
Youngstown 1, Ohio

here's plating **quality** at





its finest!



Udylite Full Automatic and the Incomparable "66" put more "sell" in accessories

"Our Udylite Full Automatic is the nucleus of the largest plating plant in the notions industry," states Mr. E. Desmond Lee, President of the Lee-Rowan Company, St. Louis, Missouri. "It was selected because of our need for increased plating production and its built-in quality control." ■ The customer-stopping appearance of Lee-Rowan accessories and closet convenience items starts with the base nickel plating. The Udylite Incomparable "66" Process provides the bright finish and top leveling action required for lustrous chrome plating or jewelry finishing in 24K gold. The result is a line of metal accessories that have become top-selling impulse items in notion departments across the country. ■ The Udylite Full Automatic, in conjunction with the many superior Udylite Plating Processes, assures top finish quality at the lowest possible cost-per-unit. Ask your Udylite Representative how you can improve your product appearance, boost sales and step-up plating production. Udylite engineers will then recommend the right machine and the right process for your specific application.

Udylite

THE UDYLITE CORPORATION
DETROIT 11, MICHIGAN

The Udylite Full Automatic installed at Lee-Rowan is 83′ 5″ long, 11′ 11″ wide and has a ceiling height of 14′ 4″. Racks are 30″ x 12″ x 54″.

BATTLES 2000°-2200°F and Wins!

This is one of several bends cast of Duraloy HOM and now in service in high temperature radiant tube applications.

HOM is a special alloy developed by Duraloy Metallurgists for operation in the 2100°-2200°F range, with limited application up to 2300°F. HOM can be cast static, centrifugal or shell-molded. The resulting casting is of exceptional uniformity, density and strength.

We are in a position to make *single* castings of HOM up to about 10 tons or multiple smaller castings for assembly into any size or shape that can be handled by carriers. Much of our work has been along the lines of assembled units.

HOM is only a few years old but Duraloy's High Alloy Casting experience is 40 years old...and that's a lot of experience! Why not rely upon it for your casting requirements—static, centrifugal or shell-molded.

DURALOY

ALLOY CASTING INSTITUTE ACI MEMBER

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DETROIT OFFICE: 1025 Maple Road, Troy, Michigan
HOUSTON OFFICE: 4101 San Jacinto, Houston 4, Texas

(*Concluded from Page* 85)

of carbide tools and as a warehousing source of electrical steels. Arthur Allcroft has been named vice president of Laminated Shim and general manager of the Lang Div.

Howell Electric Motors Co., Howell, Mich., acquired **Don Bosco Electronics Inc.**, Hanover, N. J., manufacturer of miniature transistorized testing and analyzing instruments.

ASSOCIATIONS

Air-Conditioning & Refrigeration Institute, Washington, elected these officers: President, Russell Gray, Carrier Air Conditioning Co., Syracuse, N. Y.; and treasurer, W. H. Aubrey, Frick Co., Waynesboro, Pa. Vice presidents are: J. B. Elliott, York Div., York, Pa., Borg-Warner Corp.; Thomas Hancock, Trane Co., LaCrosse, Wis.; B. E. James, McQuay Inc., Minneapolis; J. W. Norris, Lennox Industries Inc., Marshalltown, Iowa; L. N. Hunter, Crane Co., Johnstown, Pa.; and F. J. Kreissl, American-Standard Controls Div., Detroit, American Radiator & Standard Sanitary Corp.

British Iron & Steel Federation, London, announces the following appointments: Director, E. W. Senior; managing director of British Iron & Steel Corp. Ltd. (the industry's main central trading organization) in addition to his present post of financial director of the federation, J. B. Cowper; and secretary, K. Donohue. Assistant directors are: Economics, J. Driscoll; statistics, L. J. Gollop; training, B. S. Keeling; and commercial, A. H. Mortimer.

Dr. L. M. Kushner has been named chief of the **Metallurgy Division, National Bureau of Standards, U. S. Department of Commerce,** Washington.

C. H. Weaver, Westinghouse Electric Corp., Pittsburgh, has been re-elected president of the **Atomic Industrial Forum Inc.**, New York.

W. E. Dunn has been appointed executive director of **Associated General Contractors of America Inc.**, Washington.

SAFETY SOLVENT HAS NO FIRE OR FLASH POINT

CHLOROTHENE® NU solvent, by providing an answer to both of the chief hazards of common cold-degreasing solvents, is leading a breakthrough in the solvent cleaning of many materials. Having *no* measurable fire or flash point by standard methods, it is completely removed from the flammable class of cleaning compounds. At the same time, it has the desirable characteristics of the nonflammable compounds and less toxicity than other chlorinated solvents. Maximum allowable vapor concentration of Chlorothene NU solvent is a high 500 ppm, compared to carbon tetrachloride at 25.

Chlorothene NU specially inhibited 1,1,1-trichloroethane is easily recovered by distillation. It has an excellent low-corrosion record, too. Effective by spray, dip, bucket, or wiping methods, it can be used safely on most electric motors, instruments, all common metals including aluminum, zinc, corrosion-prone "white-metal" alloys, and many plastics.

Use Chlorothene NU in *your* cold degreasing. Contact your distributor of Dow solvents for complete information about its safety features, uses, recovery and cost. Ask him about Dow trichloroethylene, perchloroethylene and methylene chloride, too. Or get in touch with your nearest Dow sales office.

SEE YOUR DISTRIBUTOR OF DOW SOLVENTS FIRST!

THE DOW CHEMICAL COMPANY DOW Midland, Michigan

That's a test pilot undergoing several "G's" in one of those human centrifuges. His life and the progress of future generations depend on the performance of many tubular parts built to rigid specifications, tight tolerances.

We make stainless steel and nickel tubing in mechanical, aircraft, capillary and hypodermic grades in sizes up to 1 inch OD—plus an amazing variety of "specialties" such as super and "exotic" alloys, glass-to-metal sealing alloys and clad metals.

In addition, we produce a vast line of platinum products and chemicals that have been used by industry for over a century.

We are unique because of our ability to *work these metals to such tiny, precise forms.* Bulletin No. 13 describes our tubular products–Catalog No. P-6 describes our platinum products. Write for them.

BISHOP

Tubular Products Division **J. BISHOP & CO.** *platinum works* MALVERN, PENNSYLVANIA

A JOHNSON MATTHEY ASSOCIATE "METALS FOR PRECISION AND PERFORMANCE"

OFFICES: NEW YORK • PITTSBURGH • CHICAGO • ATLANTA • HOUSTON • LOS ANGELES

IMPROVED MAGNESIUM PROTECTION— Add to the dip type treatments for magnesium a new process called stannate immersion. Developed by Dow Chemical Co., Midland, Mich., the solution is said to provide a superior paint base. It is especially helpful when dissimilar metals are employed in an assembly. While equal parts of tin and magnesium stannate are deposited on magnesium, a tin coating forms on inserts of steel, copper, brass, and some other metals.

IMPRESSIVE— To put raised letters on the circumference of a small wheel, International Business Machines Corp., New York, employs a flat matrix in a setup much like that of a milling machine. The wheel is mounted in place of a cutter; the matrix is on the worktable beneath. About ten back and forth passes completes the embossing job.

IMPROVED CONNECTION— Silver powder sprayed on aluminum bus bars provides a superior electrical connection at a cost about 1/25 that of competing methods, states Powder Weld Inc., Brooklyn, N. Y. The coating may be applied in the field.

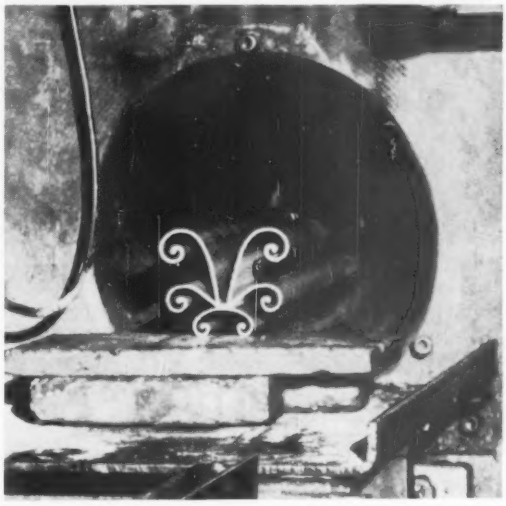
BETTER DIODE— The Japanese have a "silver bond diode" for communications equipment that is said to be more efficient than some other types. Outstanding characteristic: Extreme stability (it can withstand immersion in boiling water). Units are cheap and uniform.

BIG HASTELLOY PLATE— A plate of Hastelloy N 27 ft long, 77 in. wide, and almost 3.8 in. thick is said to be one of the largest plates made of that alloy. It weighs 2800 lb, will be employed in an atomic reactor because it resists fused fluorides containing uranium.

THERMAL POLLUTION PROBLEM— Fresh water supplies for cooling purposes could be a major problem by 1970, claims the Industrial Div., Detroit, of American Radiator & Standard Sanitary Corp. By that time, the firm expects that less than 50 per cent of new heat exchanger equipment sold will be the conventional (and inexpensive) water-cooled types. The company is investigating alternate approaches to the cooling problem.

UPGRADE THERMOELECTRIC EFFICIENCY— A germanium-silicon alloy changes heat into electricity better than currently employed lead telluride compounds, says Radio Corp. of America, New York. Temperature range: 86 to 1790° F. Power to weight ratio is about six times better, the firm claims.

ZONE MELTING SIMULATED— Advance data on zone melting of small tungsten rods are provided by a simulation technique employing an electronic, differential analyzer. The National Bureau of Standards, Washington, claims the method could be applied to other materials.



SINGLE EXTRUSION with six scroll-like members has been picked as the "most ingenious" design for 1961 by the Aluminum Association, New York. The designer: Aluminum Extrusions Inc., Charlotte, Mich. An outstanding feature: Low die cost—$285.

Magnetic Forming Shapes Up as

• MAGNETIC forming has been added to the list of practical, production tools employing explosive energies that can be used indoors. General Dynamics Corp., New York, calls its machine Magneform.

It is the third such forming method in General Dynamics' line.

The other two: Dynapak (high pressure gases plunge a ram at near sonic speed into metal blanks), and Hivopak (a quick, electrical discharge creates a spark blast—see STEEL, Nov. 13, p. 172).

Here are some of Magneform's features:

• Magnetism provides a pressure of 50,000 psi to collapse, expand, or compress metal. (Larger units can deliver up to 500,000 psi; the technique will duplicate the force of even heavy explosions.)

• Like other explosive techniques, the unit works with only half a die —magnetism furnishes the other half.

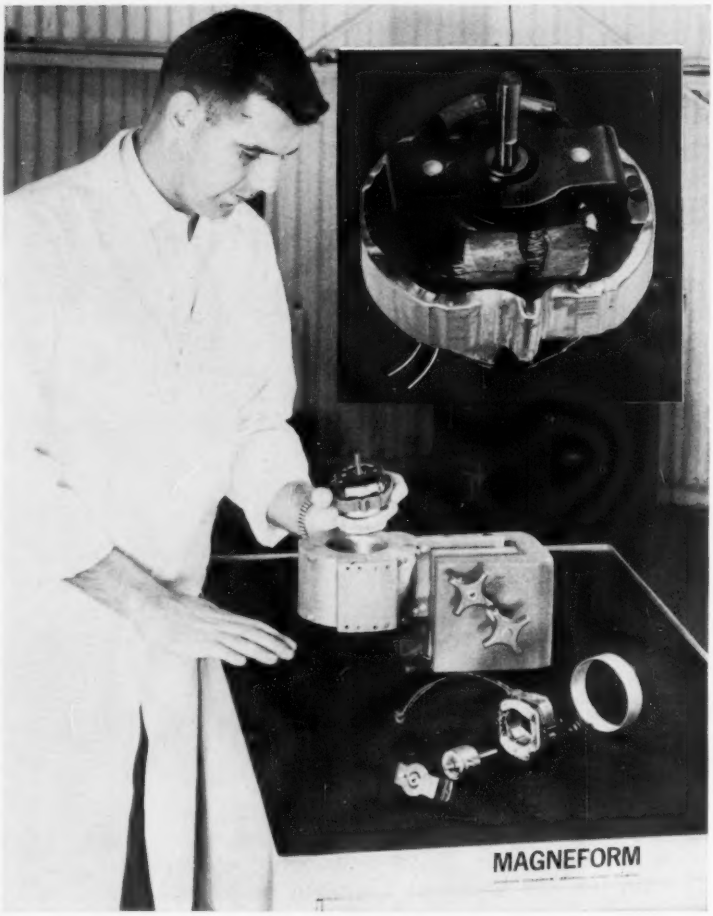
• The method eliminates scratches, mars, or surface defects common to more conventional techniques.

• It is possible, say experts, to adjust energy input of the Magneform and metal thickness to perform heat treatment and shaping simultaneously.

In addition to forming cylinders, like tubing, properly designed dies will direct the magnetic force to shear metals, dimple, blank, emboss, or coin.

Swaging can be employed to hold several parts together in an assembly. Magneform has shrunk a band tightly around small electric motors, some transformers, and loudspeaker magnet assemblies. Individual components aren't damaged by the magnetic pulse which lasts a few millionths of a second.

• The unit employs coils which can be changed easily to accommodate the variety of operations. Operating cycle is 6 seconds.



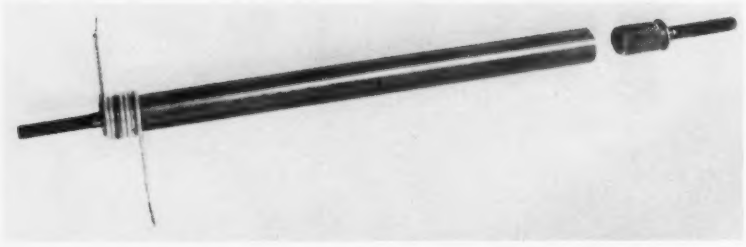
Operator is holding an assembled motor bound with a swaged metal band. (Components are shown in the foreground.) The forming unit will deliver 50,000 psi, larger ones 500,000

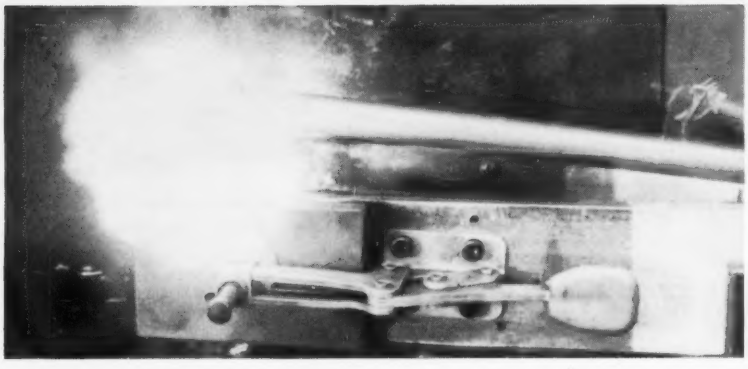
Magneform has a high voltage source, a capacitor bank, and a work coil housed in a space 2 by 3 by 4 ft. A standard, 220 volt, 60 cycle input is adequate. Controls are simple, reliable, and can be operated by semiskilled people in regular factory areas, claims General Dynamics.

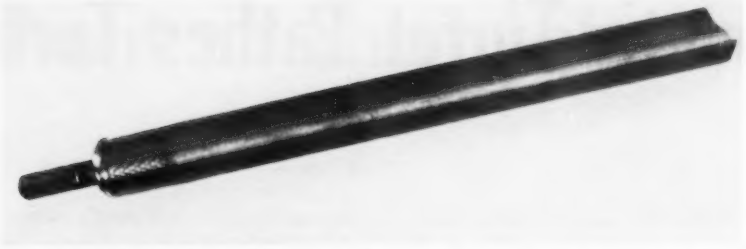
The machine's capacitor bank energy is released by a switching device. (A larger size under construction has a capacity of 120 microfarads at 25,000 volts which produces 500,000 gauss.)

Forming coils are permanent or expendable. The expendable type is a simple coil of insulated copper wire costing only a few pennies.

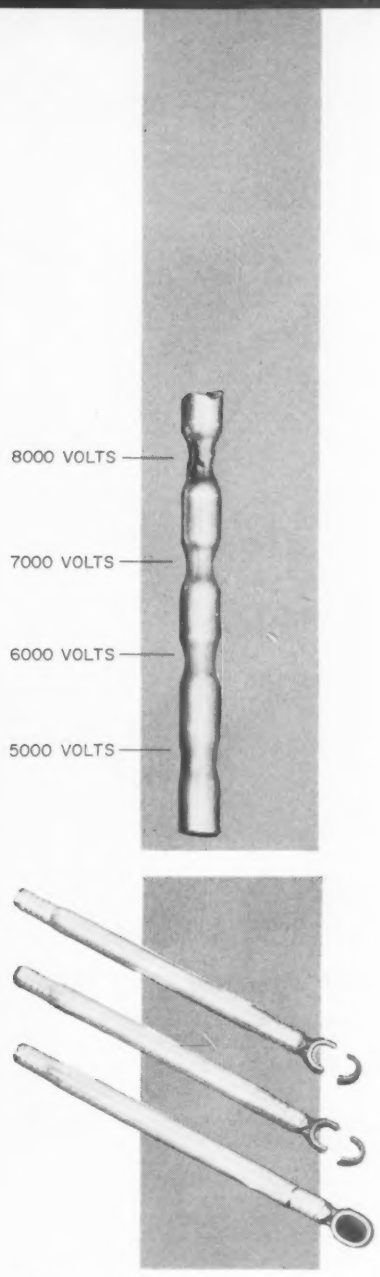
Practical Production Tool







"Quick and dirty" expendable coils like one at top make it easy to swage a tube end (bottom). Although the technique is simple and reliable, shields must be employed to trap flying particles when coil explodes (center)



Magnetic forming swages aluminum push rods so well that either the tubing or forged ends break in a tensile test. Top photo illustrates forming effects of various voltage levels

Splinter shields are needed, however, because the coil explodes during forming. It is normally employed for experimental work or exceptionally short production runs.

The permanent coil is a heavy copper helix insulated with epoxy potting material.

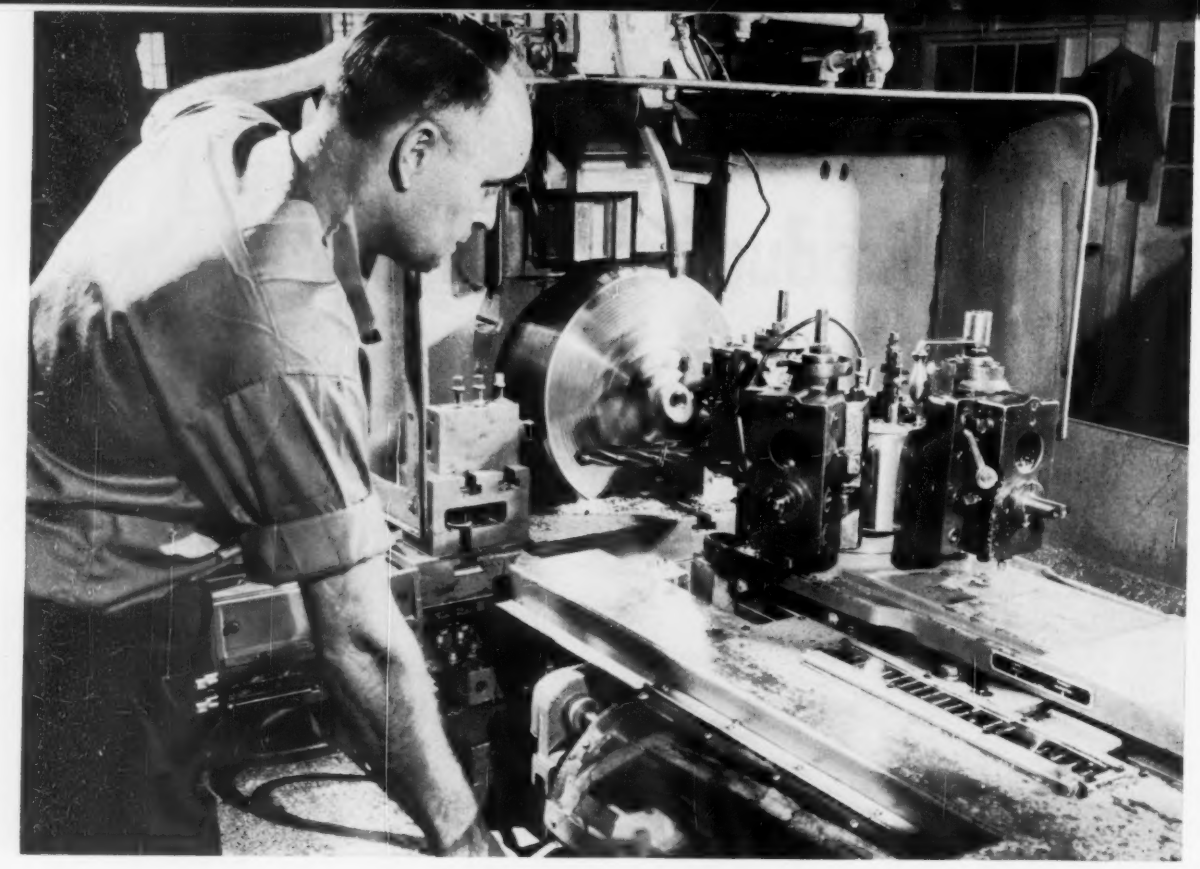
• **Magneform grew out of atomic research in controlled fusion.**

The enormous temperatures (400 million° F) needed to ignite a fusion reaction would ordinarily vaporize any known container, points out General Dynamics. The solution: A bottle formed by magnetic fields which contain the ionized gases.

Such magnetic fields are created by a pulse of energy from large capacitor banks, just like Magneform. Adapting that principle led to the magnetic forming development, says General Dynamics.

The machines are leased. Rate: $6000 a year.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*



The operator gets ready to unload and reload as . . .

Automatic Turret Lathes Turn

• A PAIR of automatic, ram type turret lathes turns out an endless variety of parts two shifts a day in a job shop near Cleveland.

The machines are also turning the shop (Trio Machine & Mfg. Co., Willoughby, Ohio) into a better competitor than it ever has been. The contract manufacturer is getting jobs that otherwise would be lost to competitors.

Vice President George M. Brueggeman explains: "With the automatic machines, we're doing turret lathe jobs in 25 to 30 per cent less time than it would take on hand operated machines; and we have just one operator running both of them."

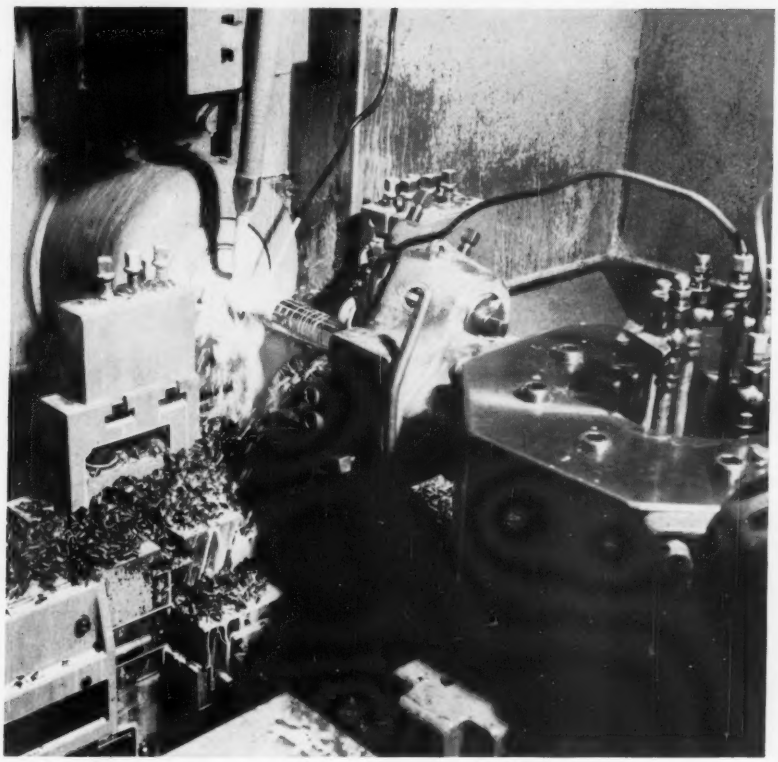
• With the same tooling that's used on hand screw machines, the automatics are bringing savings on lots as small as ten.

Mr. Brueggeman says the machines take 10 to 20 per cent longer to set up than the hand screw machines (the normal work plus setting the automatic cycle controls), but the time is regained in the faster operation of the machine. About a third of the jobs, he says, run between 25 and 50 parts.

The company bought only a couple of tools to go with the new, Gisholt No. 5, automatic ram turret lathes. The rest of the tooling (such as box turners, stock stops, and cutter holders) is the same as that used on the company's battery of conventional turret lathes. In fact, Mr. Brueggeman says that the use of normal tooling and setup methods, with which his men are thoroughly familiar, is another plus with the automatics.

• A recent order shows how machines have put the company in a stronger competitive position.

When Trio ordered the machines, it wanted maximum flexibility. Both machines have 3 in. bar capacity and automatic bar feeds. Both also have 15 in. three jaw air chucks, so they can be converted to chucking. To get maximum room for tooling, each machine has an auxil-



One of the machines has a specially built octagon turret to permit extra tooling. On some jobs, it has eliminated a second setup

Profit on Short Lots

iary cutoff slide that brings the tool in from above the spindle. Further, one machine has a specially built octagon turret, so extra tools can be used. In a couple of cases (like the stepped shaft, No. 4 at right) the eight turret faces have eliminated the need for a second operation.

John F. Whiting, sales manager, gives an example of how automatic machines pay off in a job shop. "An aluminum aircraft fitting (No. 1 at right) is back in our shop for the second time. We first ran an order of 4000 in 1958. We had to complete the whole part, starting from bar stock. At that time, we charged $2.31 per part. More than $1 of that was for material.

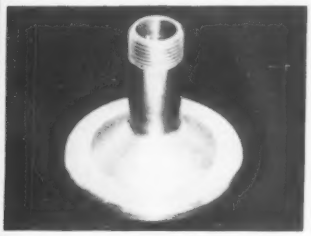
"Now we have an order for 6000. We are doing the job on the automatic ram machines, rather than the hand machines. Much of the same tooling is used. We're saving 4 minutes on each part, and our price is $2.13.

"The price is 18 cents less than we charged in 1958, despite three years of direct and indirect cost increases."

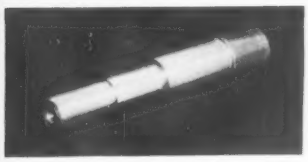
Mr. Brueggeman adds: "We've got to know our costs down to the penny, and then we've got to have equipment that will give us a competitive advantage. We know that our new machines are bringing in orders that we would otherwise lose."

1. A 2024 T4 aluminum aircraft fitting requires drilling and boring and a varied combination of turning, forming, and threading. It used to take 8¾ minutes to do the job on a hand turret lathe. On the automatics, it takes only 4¾ minutes

2. This 1¾ in., hex head bolt (AISI 4140) takes 5 minutes to run off on a hand turret lathe. On the automatic, it takes only 2¾ minutes

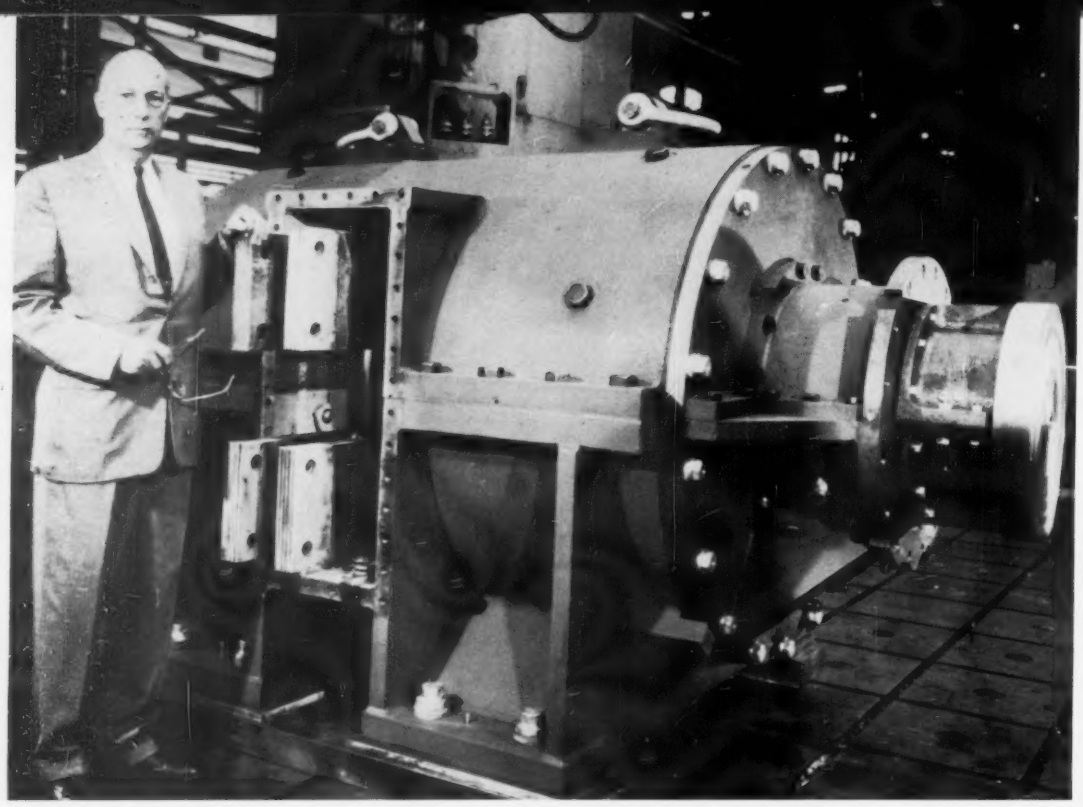


3. This is a AISI 1025 soft steel forging. Cycle time for the part is 3 minutes. Mr. Brueggeman says: "We could never have got this job if we were burdened by hand lathe costs."



4. The AISI 8620, stepped idler shaft was done with the octagon turret. It's 3½ in. long; turning, hole drilling, and tapping take 9 minutes

5. This bronze packing gland takes 8 minutes to complete on a hand turret lathe—6 minutes for the first operation. The whole job takes only 5 minutes now



M. W. Johnson, general manager, Large Motor & Generator Dept., cites efficiency and simplicity of the current collecting system of General Electric's new, acyclic generator. It's called acyclic because it produces direct current without commutation

Direct Current Without Commutation

Acyclic generator introduced by General Electric produces high amperage, low voltage power. Air Force has four units for high velocity, pulse testing

• USERS of high amperage, low voltage direct current can gain several advantages with the acyclic generator built by General Electric Co.'s Large Motor & Generator Dept., Schenectady, N. Y.:

- Continuous current capability of 150,000 amperes.
- Efficiency of 98 per cent or higher.
- High peak current capability.
- Pure dc output, free of voltage ripple.
- Ability to use economical prime movers.
- Low maintenance during continuous operation.

Two continuous duty units are under test for industrial applications at GE's Schenectady, N. Y., plant.

• The generator can handle electrolytic process applications such as aluminum potlines, where requirements might call for 150,000 amperes at 500 volts.

GE says a typical chlorine cell line rates at 150,000 amperes and 134 volts could be served by a two unit set in series.

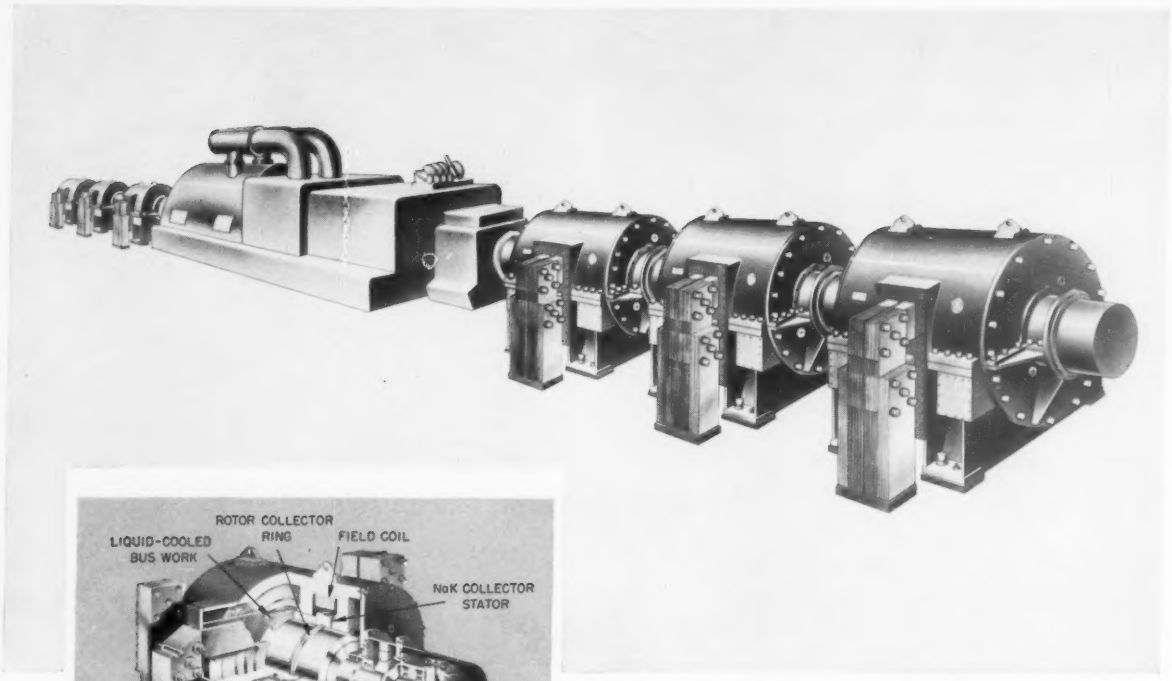
Four of the generators, each rated at 550,000 amperes, 45 volts, are in service in a hot shot wind tunnel for high velocity impulse testing at the U. S. Air Force's Arnold Engineering Development Center, Tullahoma, Tenn.

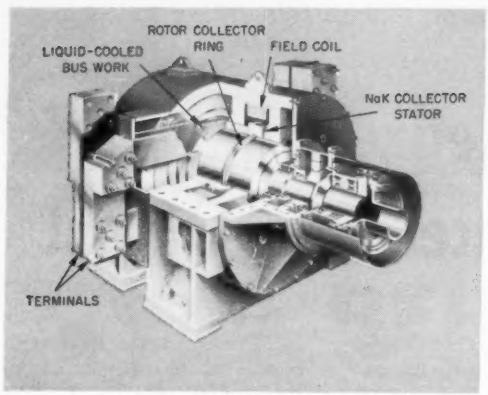
Wind speeds up to Mach 20 are produced by an arc discharge of electrical energy stored in the magnetic field of an induction coil—1 million amperes discharged in 1/100 second. The generators charge the induction coil. Another application: Particle accelerator magnets.

• The problem of current collection from high speed collector rings has been solved with a liquid metal setup.

Acyclic generators, although known since Faraday's experiments with them, have had little industrial application because of high maintenance and losses of early current collecting brushes. (Basically, operation is similar to rotating a disc in the field of a horseshoe magnet. The dc voltage generated between the shaft and rim is carried off by sliding brushes.)

In GE's design, the rotor is solid steel, integral with the shaft. The rotating part of each collector is a simple steel ring which rotates in the liquid metal of the stationary collector. The liquid metal, a eutec-



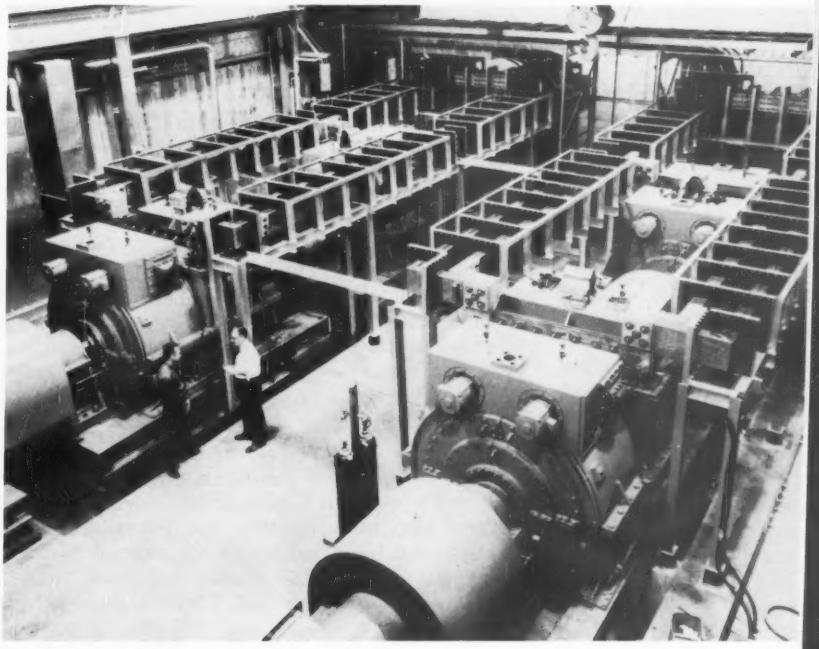


Each of the six direct current generators in this lineup is rated at 150,000 amperes, 67 volts. Driven by a steam turbine, they provide 60,000 kw power at 150,000 amperes, 400 volts

Left: Simple construction helps keep maintenance down

tic alloy of sodium and potassium, readily wets the collector surfaces and effectively carries current. Since the alloy oxidizes rapidly in air and reacts with water, the generators are enclosed and filled with nitrogen.

The steel rotor between the two collectors acts as the rotor conductor. Stator conductors and stationary collectors are insulated. The stator conductors are cylindrical copper sleeves, connected to the current collectors and running symmetrically along the air gap to the center of the machine. At the center, the conductors pass through slots in the stator core to adjacent positive and negative terminals. Current flow in the stator conductor is at all points opposite to that in the rotor. That gives maximum compensation for demagnetizing current. The annular field coils encircle the rotor, one around and immediately above each collector. One is connected opposite the other



High velocity impulse testing: Four generators, each rated at 550,000 amperes, 45 volts, power a setup that produces wind speeds up to Mach 20 (by an arc discharge of energy stored in the field of an induction coil)

so that the entire stator core between collectors is, in effect, a pair of adjacent poles of the same polarity. The flux across the gap between the collectors is unidirectional over the entire periphery.

GE says there must be an equal flux return path through the stator and rotor, half in each of the two ends outside the collectors, where the air gap flux is in the opposite direction. The entire conducting path must remain inside the two collectors and must not be cut by any flux in the return path. The flux encircles the collectors.

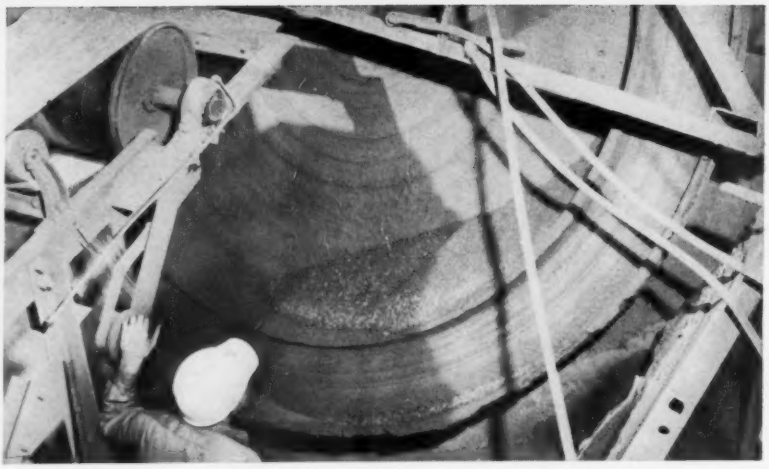
• Efficiency is above 98 per cent compared with 94 to 95 per cent for conventional, dc machines.

The unit is a shunt generator, with low regulation—5 to 7 per cent—comparable to that of a conventional, dc machine. Excitation power required is low—0.1 per cent compared with 0.5 per cent for conventionals. High current capacity is possible without damage. Design permits protection by interruption of field current and limitation of faults by field forcing schemes which can be combined readily with the current regulating system for normal load control. GE says no main switchgear is required or desirable. The units can be connected to load circuits with disconnecting switches or bus links.

• All the primary factors determining design and rating are tightly related to each other.

Since the unit has only one turn, there is no way of changing the voltage-amperage ratio by changing turns. Voltage of the one turn is proportional only to the peripheral speed of the rotor and the total air gap flux. For optimum design, GE selects the maximum peripheral speed allowed by the collectors and the tensile strength of the steel. The iron is worked to its maximum allowable flux density.

The total air gap flux must pass through the rotor cross section, half in each direction lengthwise from its center. Hence, the flux is limited by the rotor diameter, just as the speed is. Current rating is dependent wholly on the resistivity of the steel rotor and ability to remove heat effectively from its surface and from the stator.



Trial leads to three more units like this . . .

Disc Pelletizers Increase Zinc Concentrate Output

PREPARATION of sinter mix with pelletizing discs has made possible a 20 per cent increase in the output of three, zinc concentrate sintering machines at the Josephtown (Pa.) smelting plant of St. Joseph Lead Co.

The discs are used to agglomerate powdery, concentrated zinc ore and other mix components into small pellets to insure a permeable sinter bed and good combustion.

• Leaching Solution Re-used—Zinc sulfate in a water solution is employed as a binder for the pellets. The solution is drawn principally from the leaching operation, where dust from the sinter plant gases is washed with acid, so that lead and cadmium are removed. The remaining liquid, which contains zinc, is returned to the discs; zinc is recovered as the solution mixes with concentrated ore and hot fines.

As each disc revolves, particles of the mix are micropelletized to a maximum diameter of $\frac{3}{8}$ in. The disc product spills over into a hopper and feeder above each sinter machine. No effort is made to obtain uniformly sized pellets, but the natural action of the disc makes for uniformity.

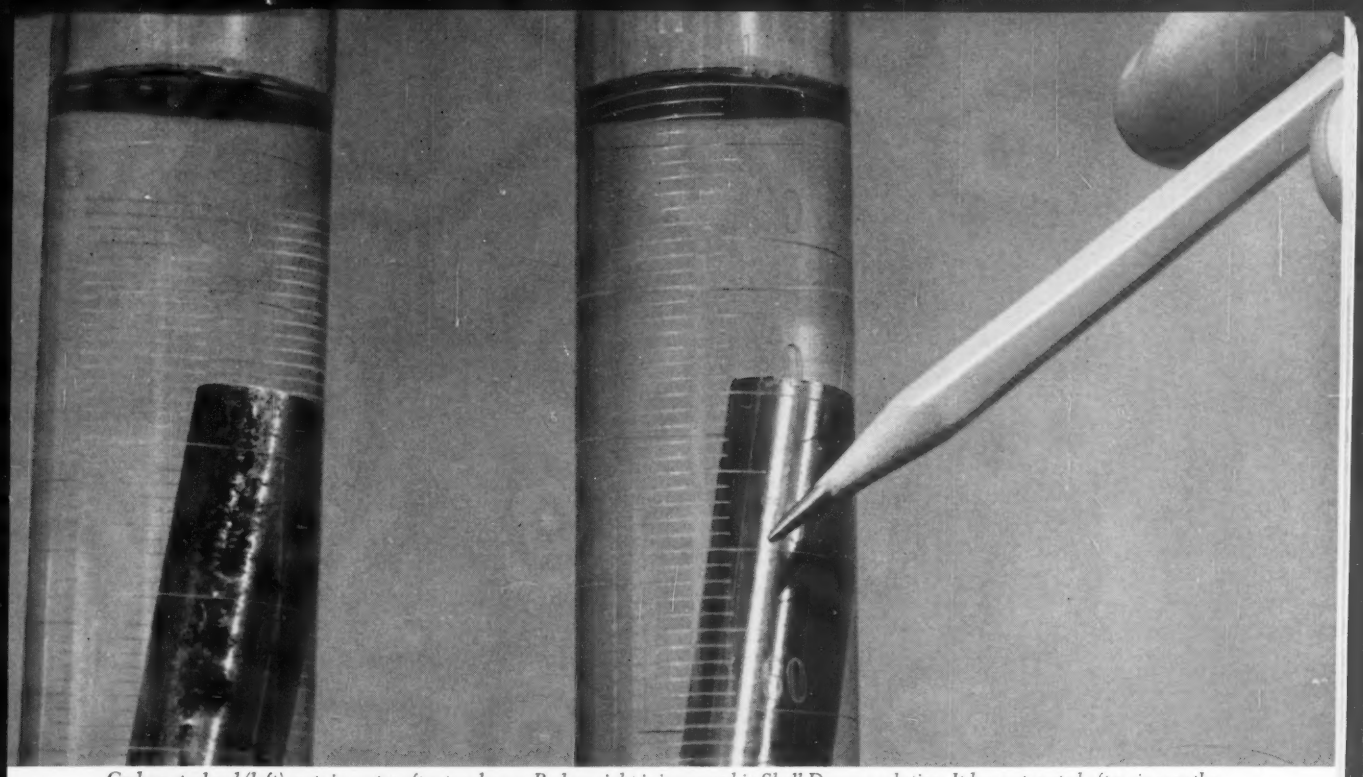
Each of the $8\frac{1}{2}$ ft discs—supplied by Dravo Corp., Pittsburgh—can handle about 30 tons of mix per hour. The mix consists of concentrated zinc ore (preroasted to remove sulfur), silica sand for hardness, ground coke for fuel, dust from the collector system, and hot return fines from the sinter screens. Components are premixed and moistened in a drum before they are fed into the disc. Additional moisture is applied on the discs.

The sintered product ($\frac{1}{4}$ to $\frac{3}{4}$ in.) is fed from the sinter machines to electric furnaces for conversion to zinc or zinc oxide.

• Adopted After Tests—The decision to use the pelletizing discs was reached after extensive tests by Dravo and St. Joseph Lead.

First step: Preliminary testing at Dravo's research center to determine how well the mix would pelletize on discs. Then a pilot operation was set up at the Josephtown plant. A 39 in. disc was employed to establish production rates and check feasibility.

Finally, one of the $8\frac{1}{2}$ ft discs was installed on a trial basis. Three more were added when the first one boosted output at least 10 per cent.



Carbon steel rod (left) rusts in water after two hours. Rod on right is immersed in Shell Dromus solution. It has not rusted after six months.

REPORT:

Shell reports on ten features of Dromus Oils that can help you reduce cutting time and costs

THE Shell family of Dromus® Oils includes both solution-type and emulsifiable cutting fluids.

Each Dromus product has its own area of application—depending on water hardness, metal characteristics and specific job requirements. However, the entire range of Dromus Oils offers these ten benefits:

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2. Dromus Oil emulsions resist foaming even under most severe conditions.

3. Dromus Oils contain an effective germicide. Result: less danger of rancidity and bacterial growth.

4. Dromus Oils do not separate. Even when mixed into emulsions containing more than 50 parts' water, Dromus Oils maintain their stability.

5. Dromus Oils prolong grinding wheel life. They prevent the wheel from "loading up" with metal from the work.

6. Dromus Oils provide effective corrosion protection for tool and workpiece. (See photograph above)

7. Dromus Oils permit greater dilution than many soluble oils.

8. Dromus Oils wash away metal chips with high efficiency. Chips then settle out of the emulsion.

9. Dromus Oils can be kept in the machine during plant shutdowns.

10. Dromus Oils are made under strict controls. Manufacture of Shell Dromus Oils is scientifically controlled.

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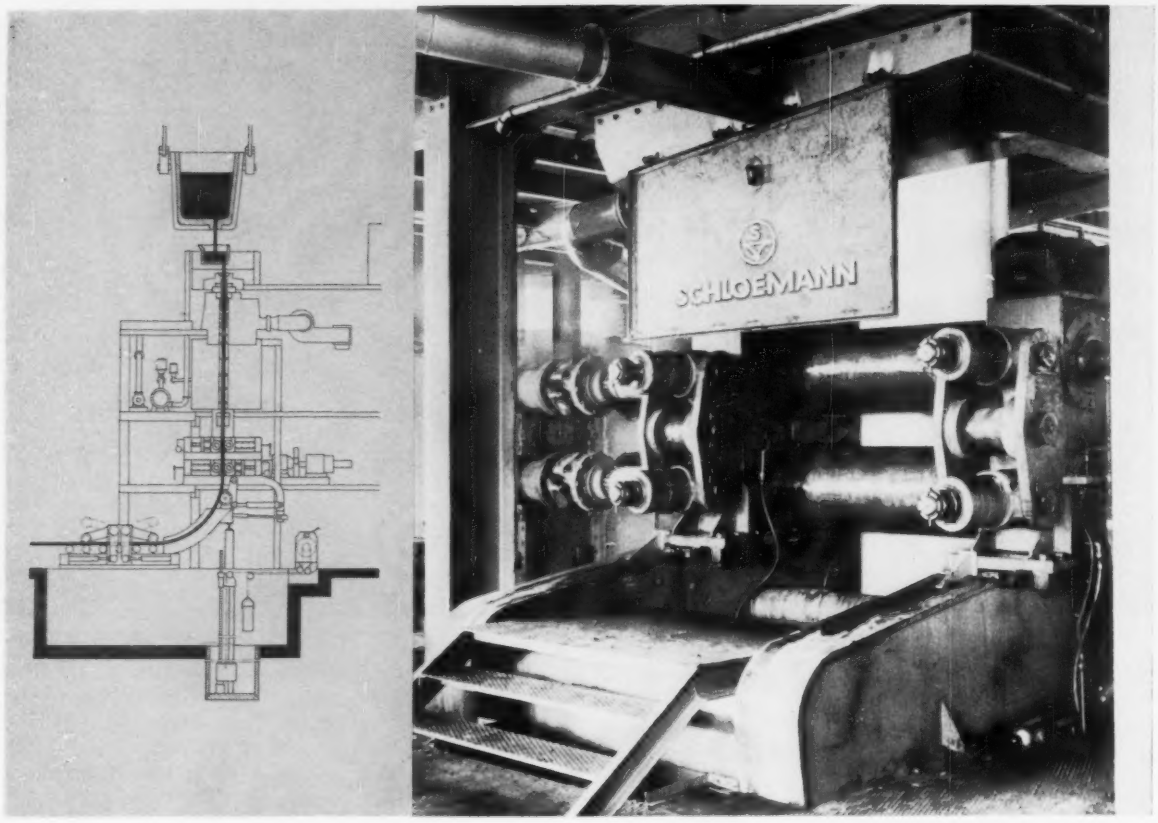


Bent horizontal for shearing, strand is poured 40 in. wide and 8 in. thick . . .

Bigger Slab Sections Boost Continuous Casting Process

STEEL SLABS up to 60 in. wide and 8 in. thick may be produced soon with continuous casting equipment at a German steel works.

Sections up to 40 in. wide and 8 in. thick are being cast at Aktien-Gesellschaft der Dillinger Huttenwerke, Dillingen, Germany. And 60 in. sections are scheduled for production in the near future.

• **Trend to Larger Strands**—The Dillingen casting facility was built by Schloemann A. G., Dusseldorf. It produces slabs for the manufacture of sheets, plates, and strip.

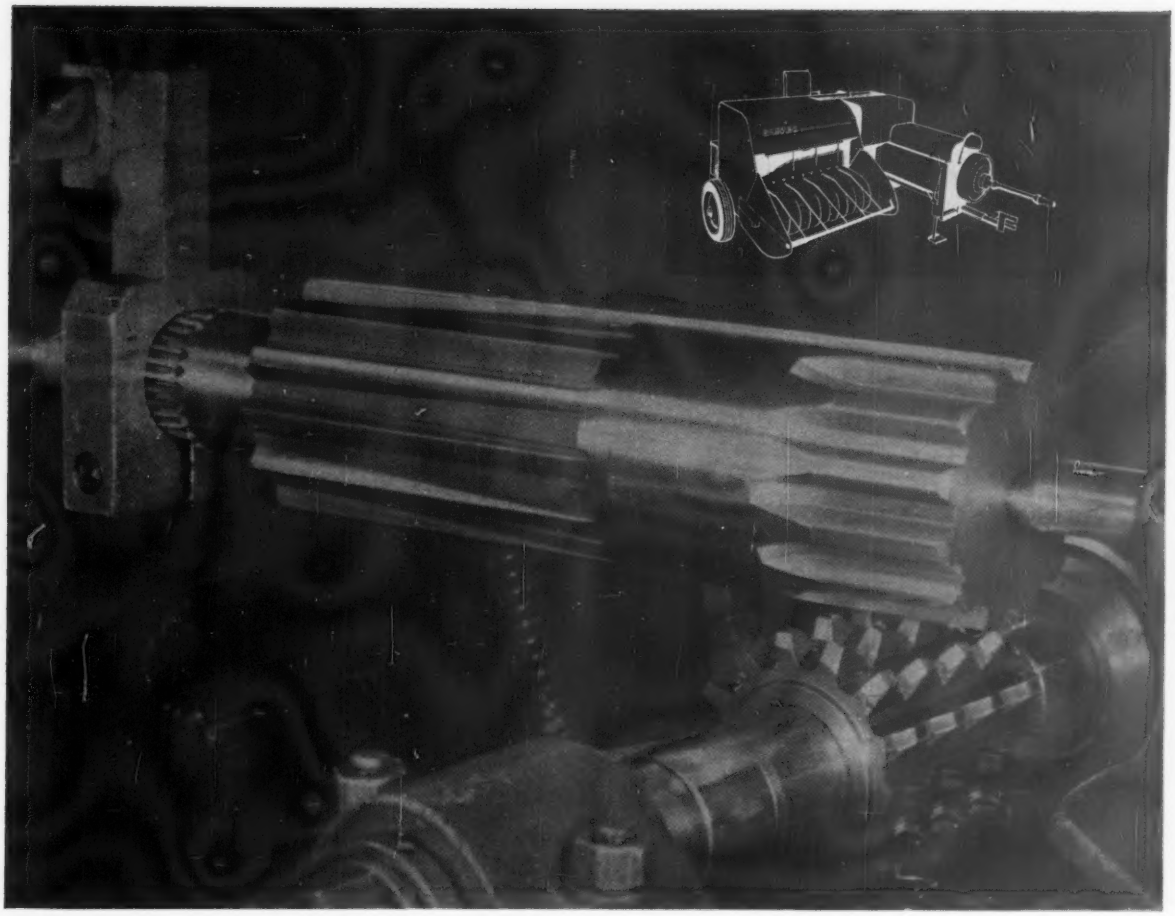
Previously, four continuous casting plants for the production of steel slabs more than 20 in. wide were built by the Concast group (Concast A. G., Zurich), of which Schloemann is a member.

• **Bent Before Shearing** — Molten steel pours from the ladle into a tundish, then passes through a bottomless, water cooled, copper mold. The outside of the vertical strand solidifies enough while it's in the mold to support the rest of the metal while it is freezing.

Pinch rolls draw the strand slowly from the mold. Then the strand is bent and positioned on a horizontal roller table by another system of rolls and sheared to slab lengths. Previously, larger strands were cut to length with flame cutting equipment while they were in the vertical position.

The Dillingen casting unit is said to function without operational difficulties. Surface of the strand is good, and the sections are said to meet close dimensional tolerances.

• **Blown Steel Used**—Steel melting facilities at the German plant include four Thomas converters. Maximum efficiency is said to be obtainable in continuous casting when blown steel is used as the starting material. Reasons: Heats of moderate tonnage reach the casting unit at frequent intervals, and metal temperature is relatively easy to control.



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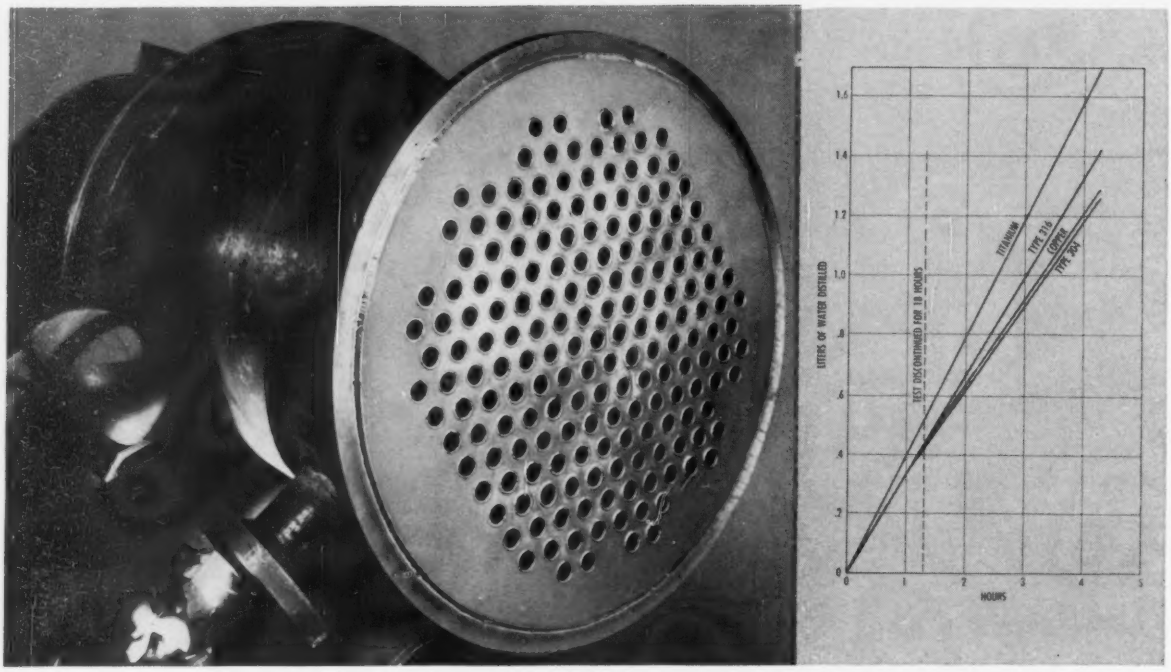

Curves showing results of tube tests, run simultaneously in a special condenser, may lead to more, large heat exchangers using titanium

Titanium Heat Exchangers Work Well in Test

• TITANIUM may make better heat exchangers than its heat conductivity indicates. Reasons: It is not wet by aqueous solutions, so condensation is in terms of drops, and there is little tendency for a film to interfere with heat transfer.

Those conclusions were drawn from preliminary work in the research laboratories of Crucible Steel Co. of America, Pittsburgh. Tests were run on water and on nitric acid. Another factor aiding good heat transfer: The metal's corrosion resistance.

• A special condenser was used to compare several metals and nonmetals.

Vapor from a boiler was passed through a condenser consisting of four tubes. Vapor passed through each tube, so it was possible to evaluate several materials at the same time. Tests with four tubes of the same material showed there was no difference in the heating results, regardless of the position of the tube in the special condenser; with some of the more complex units in commercial service, that might not be the case.

To avoid the possibility of surface films interfering with the experimental results, all tubes were degreased in trichloroethylene and polished with a wet cotton swab containing powdered pumice, then rinsed with demineralized water.

• The boiling and cooling rates were held constant, and condensate from each tube was collected.

Since the vapors were passed simultaneously through each tube, the amount condensed in each one was a measure of its efficiency in the system—under the same conditions. Cooling was provided by circulating city water through the outer jacket; the original tests showed that there was little or no difference due to position, so the results should be comparable.

• Corrosion, as well as the type of metal, influenced the results.

The corrosion products of many metals are poor conductors; and in this case, corroded surfaces reduced the effectiveness of the condenser. Corrosion products probably accounted for a reduction in collection rates of most metals when the test was repeated after being shut down overnight.

When city water or brine was substituted for deionized water in the boiler, the corrosion rates of most of the metals were accelerated. There was little change with titanium because of its low corrosion rate.

On the short time tests used, there was no attack of the titanium when acid was distilled from a 70 per cent nitric acid solution. Crucible points out that some tarnish or discoloration may be expected from titanium on longer service under these conditions.

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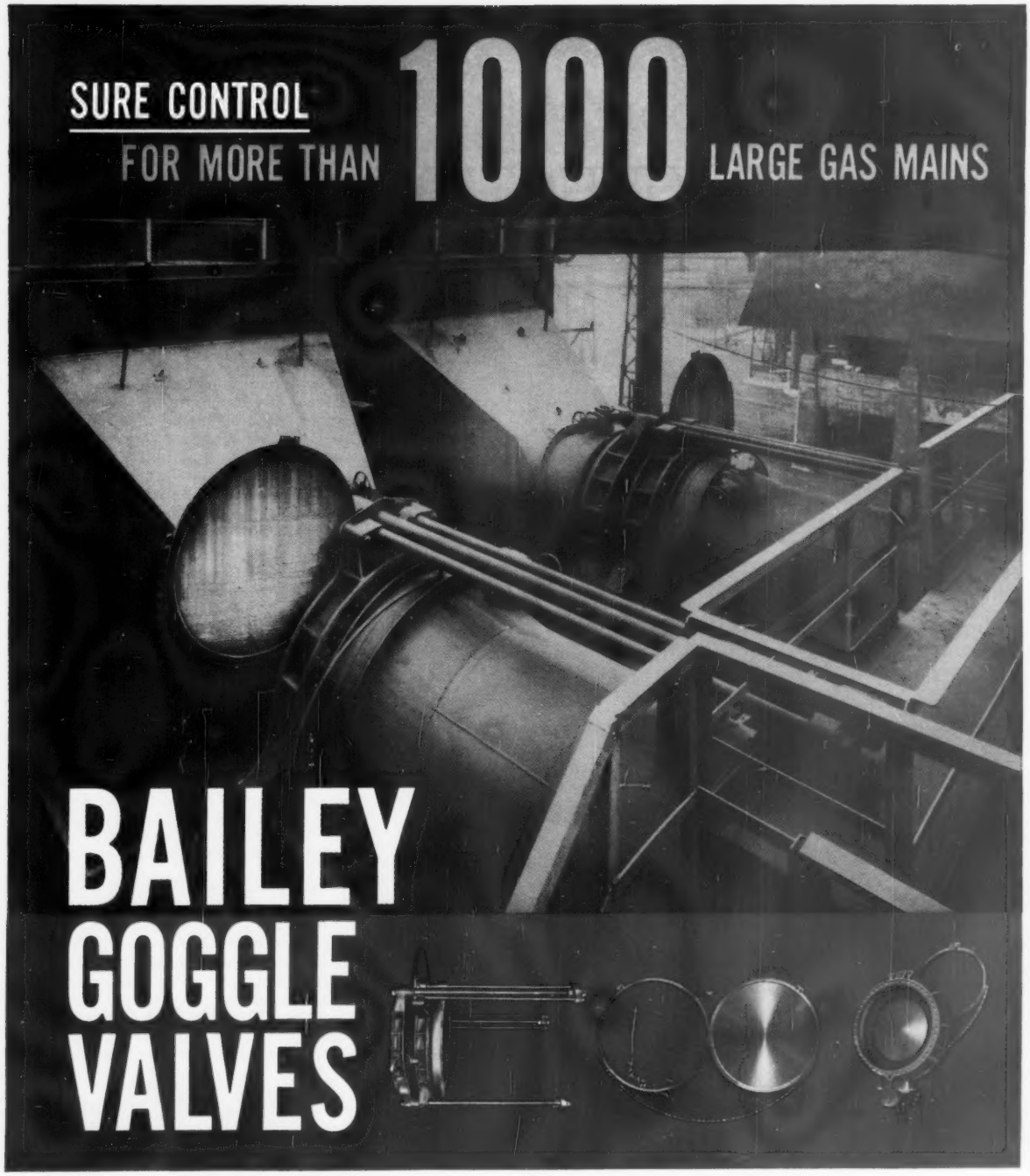

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• *Write for Bulletin.*

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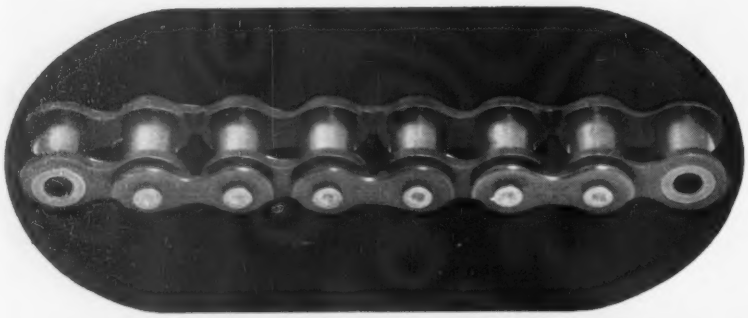

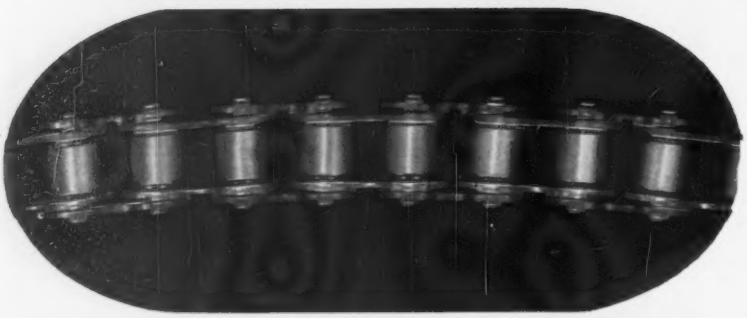

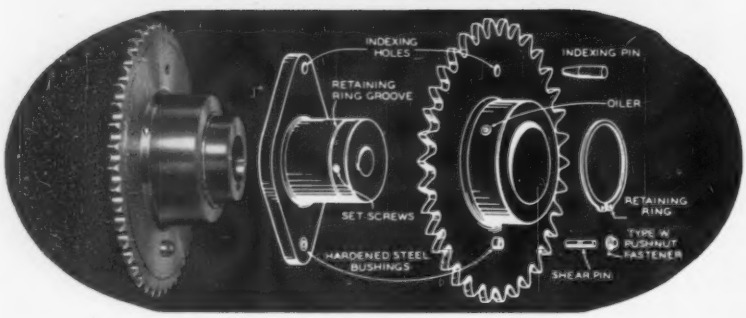

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Machine Tool Builder Proposes Group R&D

• IN THE FUTURE, you may be able to take quicker advantage of new manufacturing technologies. Group research, proposed by a leading machine tool builder, is designed to speed the transition from a new idea to its industrial application.

The suggestion comes from Alan Mattison, president, Mattison Machine Works, Rockford, Ill. He is a past president of the National Machine Tool Builders' Association, which represents most of U. S. machine tool capacity.

The continuing introduction of new techniques that may displace existing methods and equipment is a trend Mr. Mattison feels his industry must face up to.

• Co-operative research may be the answer to the inherent problems of limited size and resources of most machine builders.

Mr. Mattison feels that small builders rarely are able to finance pure research. "There is a job here for the association," he says. "As a group, we can be more aggressive in following developments in private and government research programs which potentially can affect metalworking. This should be *active* pursuit of technical breakthroughs, in their early stages, and the information obtained should be made available to all members on an equal basis."

Beyond that, however, Mr. Mattison proposes research and development pools. "Why shouldn't groups of individual builders who have a common interest in certain fields pool their resources for R&D? There are many services available to us for co-operative projects."

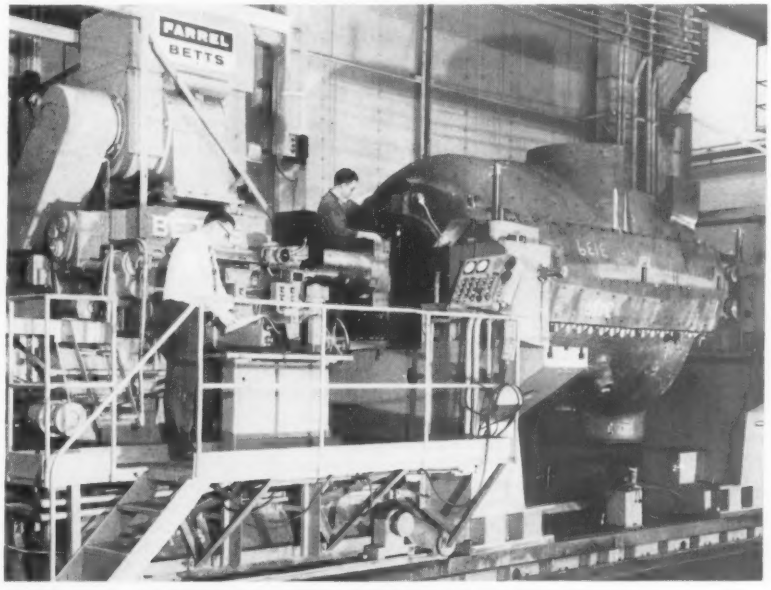
• Challenge to the machine tool industry is pointed up by recent developments outside the industry.

Development of manufacturing knowhow and equipment ought to come from the makers of that equipment, say some. Yet, Mr. Mattison, says: "Notice the high percentage of developments originating from the aircraft and aerospace industries."

Those developments, and others listed by Mr. Mattison, include: Explosive and high energy rate forming, cold forming and cold extrusion, electromachining and electrochemical machining, titanium carbide cutting tools, ultrasonic processing, coated abrasives, numerical control, and automatic tool changers.

"Large manufacturers, particularly those working on government contracts, are better able to finance pure research than small companies in our industry," he feels. And yet: "The machine tool industry must move ahead, large companies and small, by reducing the time lag between technological breakthroughs and their practical application in new types of machinery.

"Small specialist companies can survive by co-operating with other builders in R&D. And the association can assist by 'bird dogging' government research projects and new developments."



Machine Head Does Turnabout

A MACHINE innovation solves complex setup problems on turbine shells at the Large Steam Turbine-Generator Dept., General Electric Co., Schenectady, N. Y. The machine, built by Consolidated Machine Tool Div., Farrel-Birmingham Co. Inc., uses either stub boring bars or a Thru bar. When one end of a shell is completed, a shop crane can pick up the whole spindle unit and move it to the other end of the bed. Resetting the spindle unit takes about 2½ hours. It used to take 8 hours to reset the turbine shell on a machine table.

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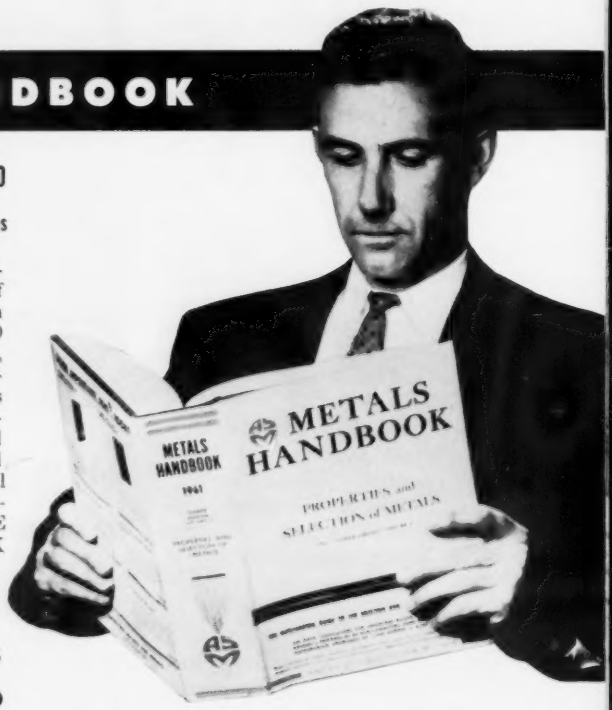

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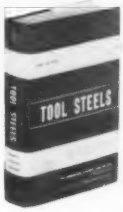

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Probably the best known and most widely used book on this important operation in the steel field.
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Covers materials and fabrication problems associated with high-strength, lightweight steels.
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Newer concepts in the study of magnetic phenomena as seen from the points of view of the physicist, chemist, and metallurgist.
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A CORROSION OF METALS

Principal problems involved in the corrosion of metals and factors contributing toward control.

B MACHINING OF METALS

Experts report on machining wrought and cast alloys, tool steels and nonferrous metals.

C UTILIZATION OF HEAT-RESISTANT ALLOYS

General principles; engineering practice in design and selection of materials; fabrication.

D WHAT STEEL SHALL I USE?

Details the approach on how to answer this question.

E FRACTURING OF METALS

Fracture phenomena; effects of section size; fracturing of low-carbon steel; measurements for combined steel experiments.

Cryogenically cooled magnets can be operated on as little as 1/200 the electric power required at room temperature. It was one of the considerations in the design of a large, air core, aluminum electromagnet that will be built by the National Aeronautics & Space Administration (NASA) for experiments in plasma heating and acceleration. Neon will be used to cool the magnet because of its low boiling point (−410.8° F) and because it isn't combustible. The neon, in turn, will be cooled by hydrogen in a heat exchanger system. Refrigeration equipment and neon for the magnet will be supplied by Air Products & Chemicals Inc., Allentown, Pa.

Supercool Aluminum Magnet Lowers Power Consumption

• SUPERCONDUCTIVITY of metals and alloys at cryogenic temperatures makes it possible to create magnetic fields of extremely high intensity (see STEEL, Nov. 27, p. 131). The principle will be applied in a neon cooled magnet by the Lewis Research Center, Cleveland, of the National Aeronautics & Space Administration (NASA). It will be used in studies of plasma heating (for power generation) and acceleration (for propulsion) in space travel.

The design of the magnet and its cooling system was described in a technical paper at the International Conference on High Intensity Magnetic Fields, in Cambridge, Mass. Authors: Two researchers from the NASA facility (James C. Laurence and Gerald V. Brown) and two scientists from Air Products & Chemicals Inc., Allentown, Pa. (Jacob M. Geist and Kenneth Zeitz).

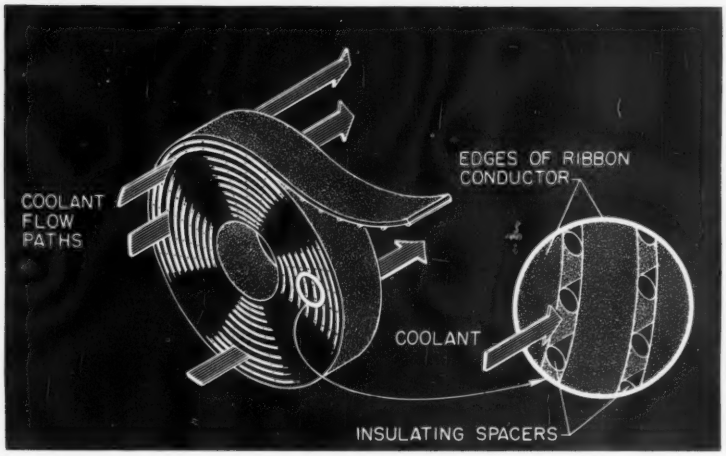
• Cryogenic cooling cuts resistivity (and power consumption) in magnet coils. Field strength increases proportionally with current density and coil dimensions.

Electrical resistance in metals has been found to drop significantly as temperature approaches absolute zero (−459.7° F). Example: Resistivity of copper at −423.7° F is only about 1/120 its value at ambient temperature. That drop in resistivity is accompanied by a decrease in conductor resistance and power dissipation.

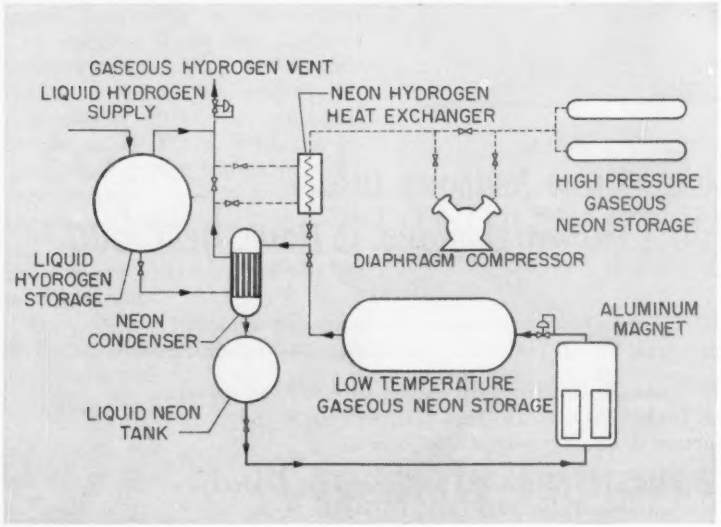
Field strength is proportional to current density and linear coil dimensions. Result: A higher field strength can be generated with a given current density if coils are made larger without changing their geometrical proportions.

• A magnetic field about 6½ ft long and a foot in diameter will be created for the NASA experiments (see STEEL, Nov. 27, p. 96).

A magnetic mirror system made up of three solenoids will provide a field about 6½ ft long and a foot



Open windings of aluminum ribbon will allow free flow of liquid neon



Magnet coils are cooled in a bath of liquid neon. Vapor formed in the operation is reliquefied in the condenser and cooled in a heat exchanger that employs liquid hydrogen as a refrigerant

in diameter. The field will be used in experiments on magnetohydrodynamics (MHD). Each cycle will last about a minute.

The magnetic field, which will be about 200 kilogauss, will require 1 megawatt of power at operating temperature (about −410.7° F). Generation of that field at 70° F would require about 200 megawatts.

• Liquid neon will be used to keep magnet coils cold.

Refrigeration equipment, which will be supplied by Air Products & Chemicals, will employ liquid neon to cool the coils from −319.3° F to −410.7° F. (Cooling from ambient temperature to −319.3° F will be done with a liquid nitrogen system.)

Specifications call for a refrigeration unit that can cool 5 tons of copper from −319.3° F to −410.7° F. About the same capacity is needed to compensate for anticipated heat leaks, so the refrigerator must be able to liquefy more than 4600 lb of neon per day. The system will use almost 100,000 cu ft of neon, or about 20 times the previous annual consumption in the U. S.

Neon was chosen as the refrigerant because it isn't combustible; it has a low boiling point (−410.7° F); and it can be obtained as a by-product from tonnage oxygen plants, like the Cleveland facility operated by Air Products & Chemicals.

Helium, which costs about 1/20 as much as neon and has a lower boiling point (−452.1° F) was considered. But the over-all cost of a refrigeration system that used helium would have been roughly three times that of the neon unit. Hydrogen couldn't be used in contact with the coils because it is combustible.

• Coils will be made of aluminum because of its low resistivity at the temperature of liquid neon.

The choice of coil material is said to be extremely important in the design of the neon cooled magnet. Aluminum ribbon of 99.999 per cent purity appears to be ideal because of its ultralow resistivity at the proposed operating temperature. And such material is available at a reasonable price, say the authors.

Strands of insulating material will be employed in the coils as spacers, to permit passage of the liquid neon.

Analysis of forces to be encountered in the windings hasn't been completed. But it may be necessary to wind stainless steel ribbon with the aluminum, for additional strength.

• Liquid hydrogen will be used in a heat exchanger system that liquefies the gaseous neon.

The refrigerator will include a closed, neon, heat transfer circuit, which will use liquid hydrogen as the source of refrigeration.

The "cold box" for the magnet will contain enough liquid neon to cover the magnet coils during operation. A vacuum jacketed tank will provide low temperature storage for neon gas generated when the magnet is operated. A condenser will reliquefy the neon vapor, and the liquid will be stored for re-use.

Before the refrigerator is charged with neon, the system will be evacuated (helium may be used for purging). The condenser and neon storage tank will be cooled with liquid nitrogen passing through a coil on the shell of the inner tank. Then liquid hydrogen will be introduced in the condenser to liquefy the neon.

Liquid nitrogen will also be used for precooling the electromagnet.

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✓ OHIO is your most complete source for drawn-welded tubing—from ⅜" to 7¼" OD, from .028 to .344 wall thickness.

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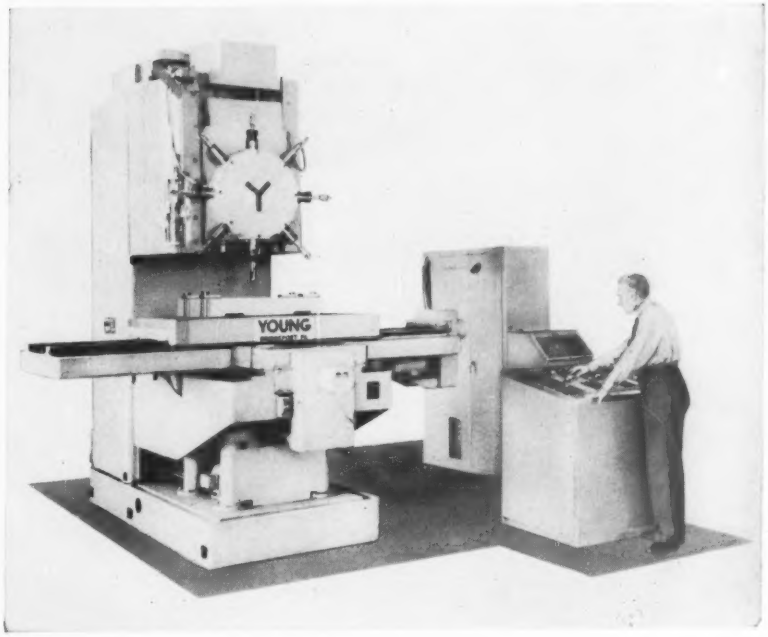
Instant Depth Setting Featured on Turret Drill

HEAVY construction and instant depth setting are features of a tape controlled, turret drill. The manufacturer says the eight spindle, turret assembly can take extremely large thrust loads. The turret indexes clockwise or counterclockwise.

Each spindle has 12 speeds, instantly available. All spindles are instantly reversible by tape control. The machine is capable of turret indexing to ±0.0005 in., table positioning to ±0.001 in., position repeatibility to ±0.0005 in., and depth control to ±0.002 in. With the instant depth setting feature, the tool cutting depth for each spindle can be set on its matching depth control to 0.001 in. in 1 minute. A tool can be replaced and reset in less than 2 minutes.

For further information, *write* McBeth Machinery Co., 522 Gulph Rd., Haverford, Pa.



Capability Improved on Fork Truck Line

FASTER travel speeds, faster acceleration, higher lift, lower speeds, shorter turning, more positive traction, and up to 45 per cent gradeability—that's how Clark compares its new line of fork trucks with previous models.

The line has six basic models with capacities from 15,000 to 25,000 lb. Users can choose from two transmissions and three engines. Standard equipment includes power steering, power brakes, overhead guard, and premium grade tires. The units are more compact than previous models. Over-all length and wheelbase measurements have been reduced as much as 21 in. on some models. Many components have been standardized to make them interchangeable among all models.

Improvements in the hydraulic

(*Please turn to Page* 116)

A message from G. Washington

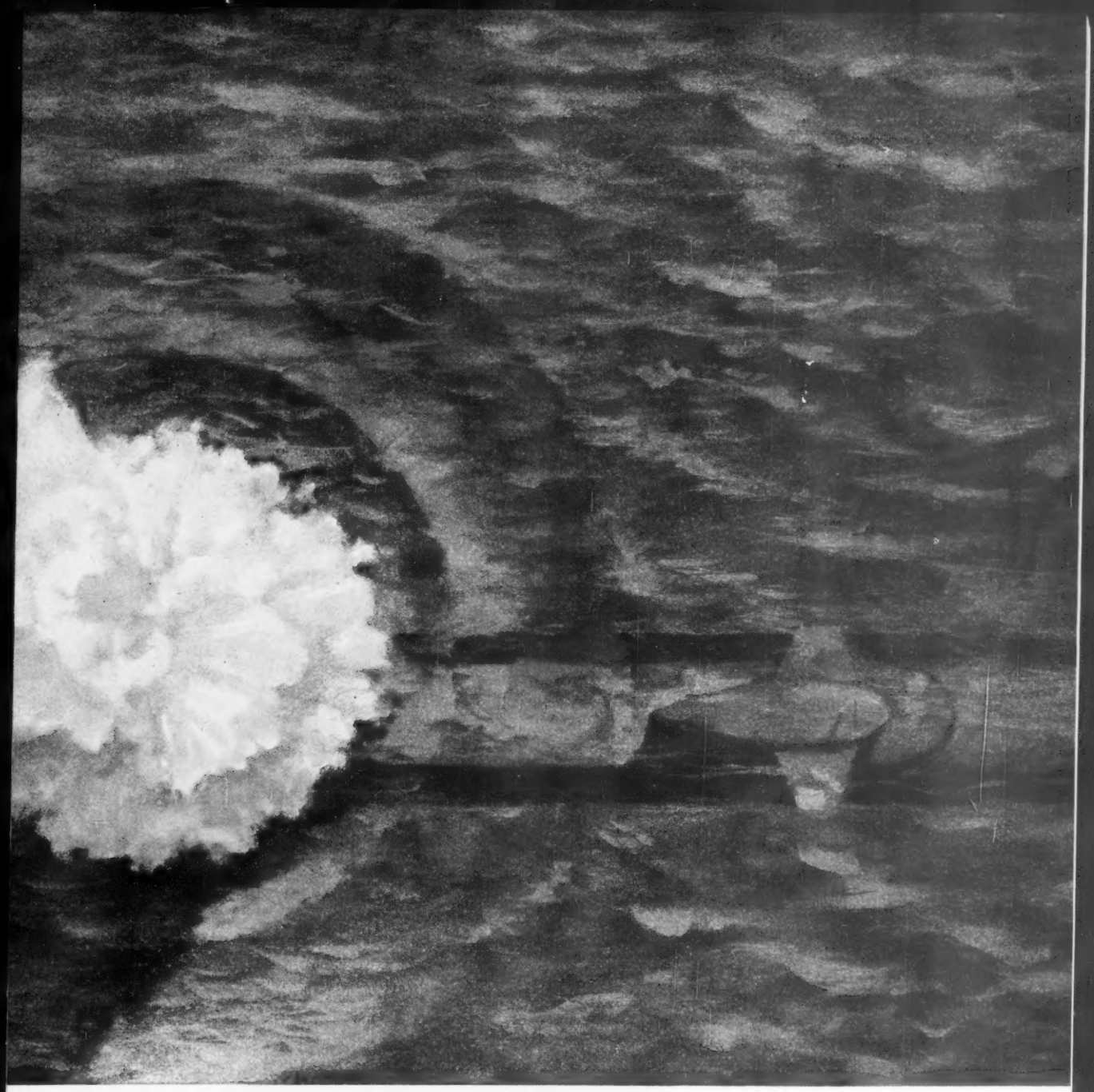
On January 8, 1790, the First President of the United States said, "To be prepared for war is one of the most effective means of preserving peace."

The USS George Washington, built by Electric Boat Division, General Dynamics Corporation, is the Navy's first mobile ballistic missile base. Cradled inside its steel hull will be 16 business-like Polaris missiles. This new, atomic-powered submarine dives or surfaces as gracefully as a porpoise and it speeds along in excess of twenty knots.

The Polaris Fleet Ballistic Missile (FBM) will be a deterrent weapon. It has a range of 1,200 miles, and travels at speeds up to 10,000 mph. Approximate time from submarine to target: less than 20 minutes.

Compressed air will eject the Polaris. The missile's solid-fuel engines ignite with a roar as it leaps clear

This mark tells you a product is made of modern, dependable Steel.



of the water. This new launching method protects the sub from rocket back-blast, and makes it possible for the George Washington to pump a full load of these nuclear-armed missiles into target in minutes.

As part of the Navy-industry team that developed the Polaris and the George Washington, National Tube supplied USS National Seamless Pipe and Tubes, in both carbon and stainless steels, and USS National Seamless Steel Cylinders for air and oxygen systems. If you have a problem related to the field of pipe, or tubular applications, write National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. *USS and National are registered trademarks*

National Tube
Division of
United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

(*Continued from Page* 113)

system have brought lifting speeds up to a maximum of 105 fpm. Hydraulic components include a gear type, 75 gpm pump which is direct driven at engine speed. The main hydraulic valve is a spool type with full feathering to provide absolute control. Safety relief valves are built in. Two filtering systems completely filter all hydraulic fluid every 3 minutes.

High strength steels and a new welding technique enable the upright to safely handle off-center loads without distortion of lift chains or other components.

For further information, *write* Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

Compact Silicon Rectifier Handles Industrial Work

CLAIMS for a compact, general purpose, industrial silicon rectifier include low initial cost, installation and maintenance savings, and dependable, efficient operation.

The self-contained unit can provide dc power for cranes, hoists, elevators, magnetic chucks, machine tools, and similar equipment. It's available in one compact size for all ratings (100 to 300 kw, 208 to 575 volts, three phase, 60 cycle ac at 125 or 250 volts dc). The unit has overload ratings of 125 per cent for 2 hours and 200 per cent for 10 seconds—following continuous loading at 100 per cent in either case.

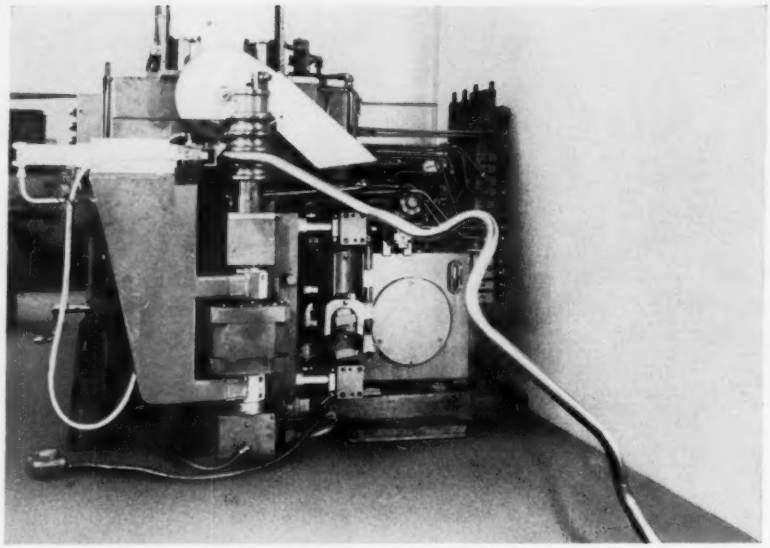
For further information, *write* I-T-E Circuit Breaker Co., 1900 Hamilton St., Philadelphia 30, Pa.

Accessory Edges, Patterns Steel, Aluminum Sheets

STEEL or aluminum sheets can be pattern and edge rolled by an accessory designed for the roller level and cut to length line made by Huron.

Pattern rolling equipment consists of two or four hardened steel rolls with a capacity of 0.020 in. in mild steel or 0.040 in. in half hard aluminum. Maximum width is 48 or 60 in., depending on the model.

For further information, *write* Huron Inc., 8348 Vine St., Cincinnati 16, Ohio.

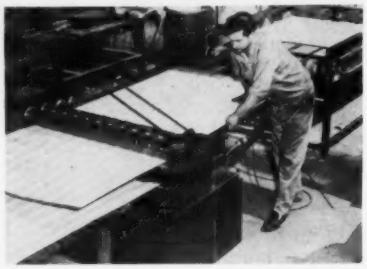


Tube Bending Machines Tape Controlled

TAPE CONTROLLED, tube bending machines are offered by Baldwin-Lima-Hamilton. Designated Bend-O-Matic, the machines use punched tape to program the bending of straight tube stock to desired angles and contours, accurately and economically. Large or small quantities can be produced without the need for elaborate tooling.

One model, Series 100, sequences automatically to complete a tailpipe in 2 to 2½ minutes (average) and permits manufacturers to produce different designs as they are required. Another machine, Series 200, is designed for general industrial use. Applications include complex fuel and hydraulic lines and chemical processing piping. Patent, manufacturing, and marketing rights were purchased from Nu-Era Corp., Rochester, Mich., for the Series 100 and from Walter P. Hill Inc., Detroit, for the Series 200.

For further information, *write* Industrial Equipment Div., Baldwin-Lima-Hamilton Corp., Philadelphia National Bank Bldg., Philadelphia 42, Pa.



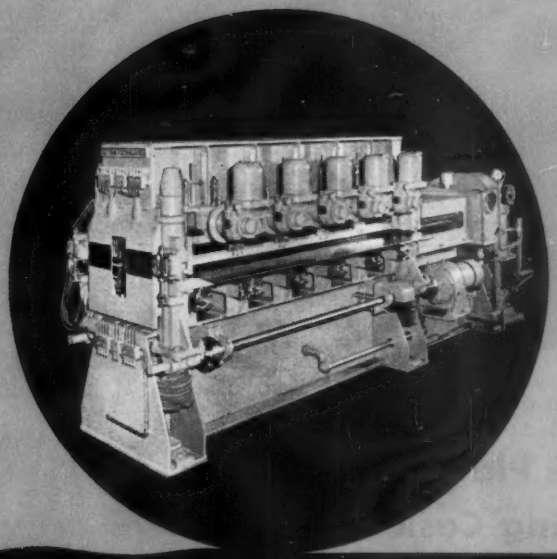
Sample in Test Machine Heated by Electron Beam

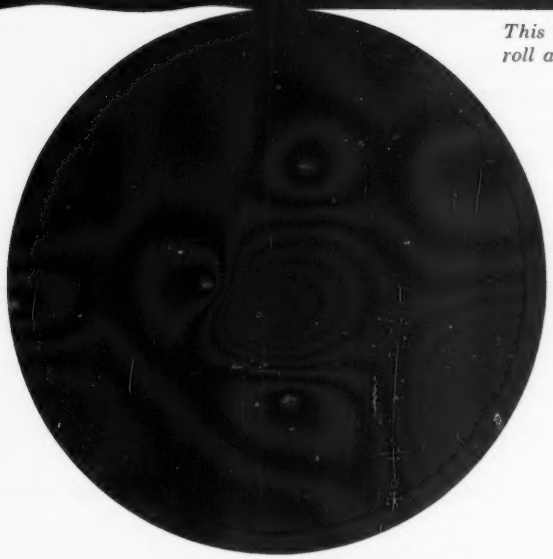
A LINE of electron beam furnaces has been designed to heat test specimens in tensile and creep test machines up to 6000° F while visible for optical measurement. Prolonged test periods are possible without the use of heat shields.

The basic unit provides continuous control and temperature profile regulation from 2000 to more than 6000° F by the use of grid controlled, electron beam guns and a sweep programer which compensates

ROLLER LEVELERS

What kind of roller leveler do you need for your particular product? Want high speed? We have high speed levelers. Want an economical model for less demanding work? We have one of the best models in the business. Want a quick opening head? We have either hydraulic or motor-operated or hand-operated models. Want centralized lubrication? We equip all levelers with centralized lubrication with the exception of a few models. Want antifluting? We have it. Want individual adjustment or centralized adjustment? We have both types. Want more roll life per redressing? All of our rolls are induction hardened. Want an existing leveler reconditioned? We have an efficient service setup. What size leveler do you need — 1⅛" up to 18" diameter work rolls? We make all sizes and types. In fact, the Aetna-Standard Division of Blaw-Knox is one of the major manufacturers of Roller Levelers. For information, write to Sheet and Strip Sales, Aetna-Standard Division, Blaw-Knox Company, 300 Sixth Avenue, Pittsburgh, Pennsylvania.



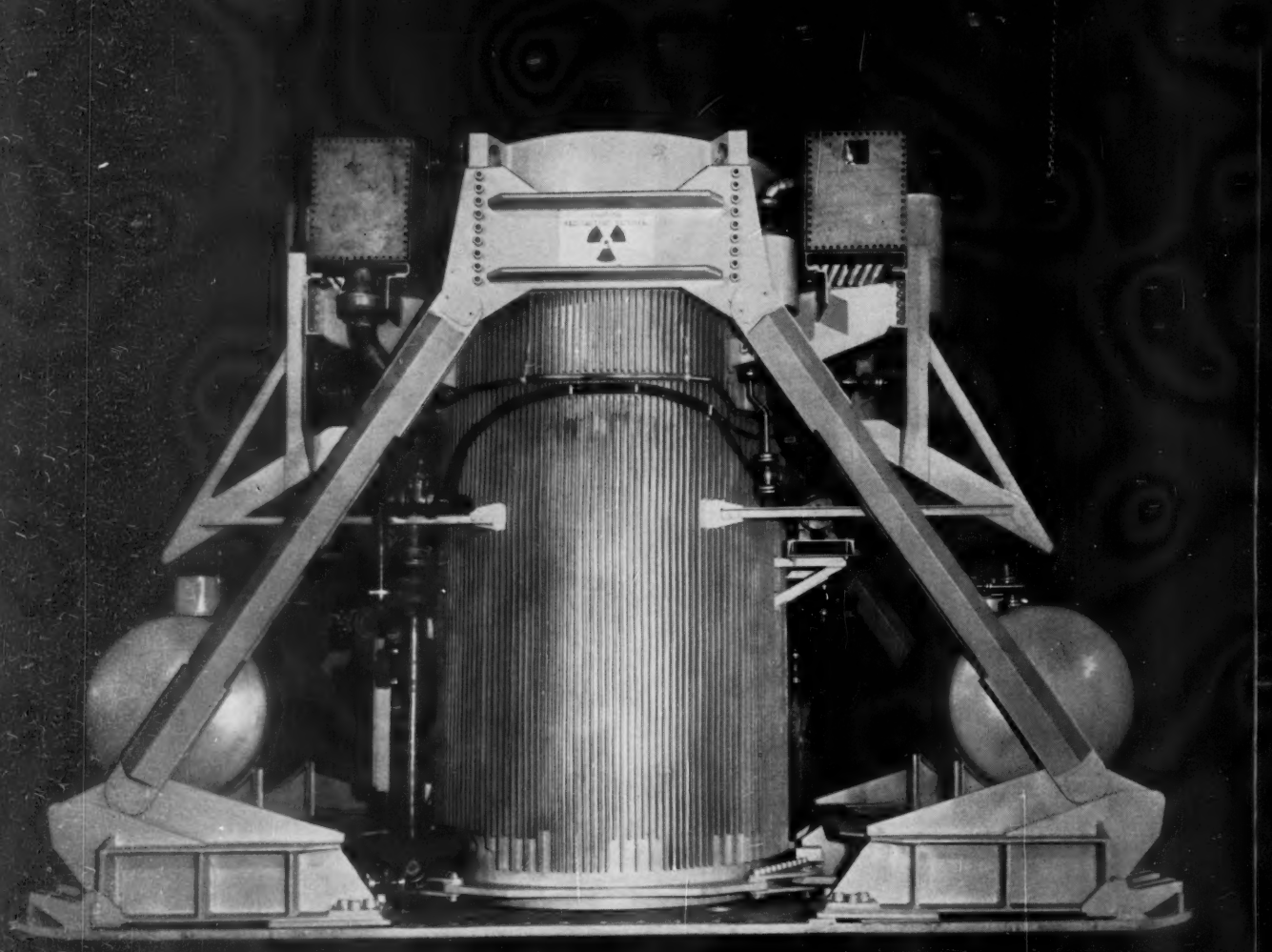


This Roller Leveler has individual motor-operated backup roll adjustments. 1¾" dia. x 72" face . . . 21 rolls.

BLAW-KNOX

Aetna-Standard Division

BLAW-KNOX



for safety's sake there's Carlson Stainless Plate in this Spent Fuel Shipping Cask

One of a group of Spent Fuel Shipping Casks designed and fabricated by Knapp Mills Incorporated for General Electric Company.

Photo courtesy of Knapp Mills Incorporated.

Spent atomic fuel is "down but not out." Containing unused uranium, it still must be handled safely and surely in being moved by rail, boat, or truck to recovery stations throughout the country.

Carlson Type 304 stainless steel plate was used in various parts of these shipping casks. Designed and fabricated by Knapp Mills Incorporated of Wilmington, Delaware, each cask weighs approximately 125 tons.

For maximum assurance—whether you build chemical, process, nuclear, missile, or aircraft equipment—specify dependable Carlson stainless steel plate. Specialists produce the material to meet your exact specifications. Your fabrication is easier—true-up and finish-welding is done quickly and efficiently. This, plus prompt delivery, is the total Carlson service you can count on—write, wire or phone today for complete information and assistance.

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for end losses. Extras include temperature feedback and recording circuits and optical extensometer systems.

For further information, *write* Electron Heating Corp., 82 Hicks Ave., Medford 55, Mass.

Humidifier Removes Up to 300 lb Water per Day

THE D20 industrial humidifier has a water removing capacity up to 300 lb daily. It employs a 2 hp, hermetically sealed, refrigeration cycle and is recommended for use in ambient temperatures from 50 to 110° F and relative humidities down to 40 per cent.

Air circulated by the unit passes through a replaceable filter. Standard models are available for 208 or 230 volt, 60 cycle or 200 or 230 volt, 50 cycle, single phase, current, says the company.

For further information, *write* Remington Air Conditioning Div., Remington Corp., Auburn, N. Y.

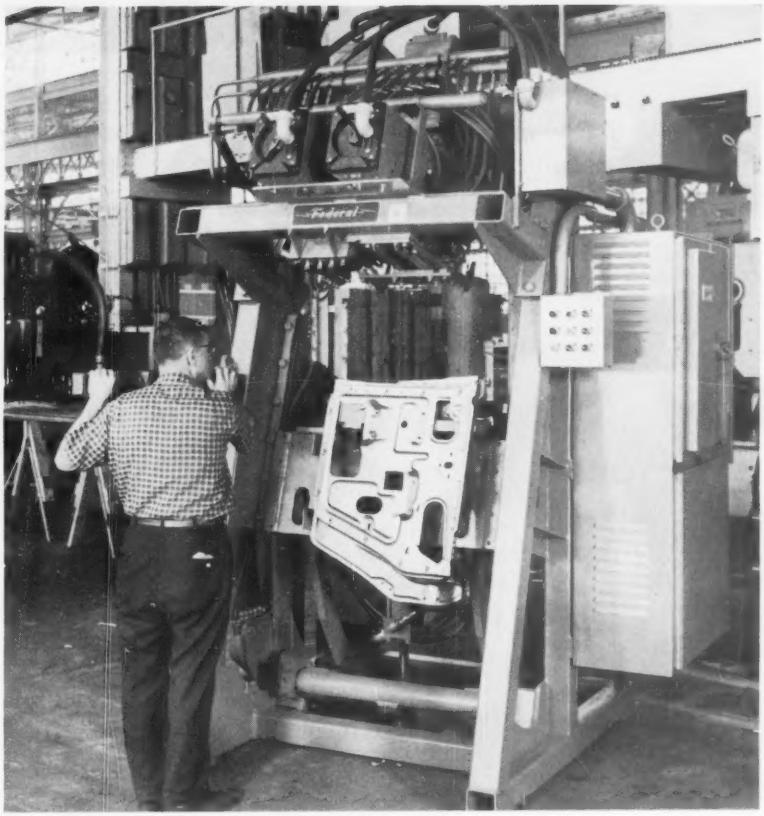
Portable Tool Cuts Stainless, Mild Steel

TESTS with the AMN Fenway nibbler show no surface distortion in the cutting of 14 gage stainless and 13 gage mild steel at 70 in. per minute, reports the equipment maker.

The air operated unit is said to be practically maintenance free and able to operate in hazardous atmospheres and under water. Air requirements: 25 cfm at 90 psi. The tight, 1 in., cutting radius is an aid on intricate jobs.

A heavier duty model, AEHN, is available.

For further information, *write* Fenway Machine Co. Inc., 1910 N. Marshall St., Philadelphia 22, Pa.



Machine Spotwelds Door Assemblies

A SPECIAL machine spotwelds upper and lower hinge reinforcements and an extension part to inner door panels at a rate of 120 or more per hour. The unit has 32, hydraulically operated, spotwelding guns powered by nine, 50 kva, packaged type, welding transformers.

Three parts are loaded onto the lower die by the operator, who then places the inner door panel in position. Locators are provided to hold the parts.

The operating sequence is initiated by pushbuttons. The lift table raises the panel into welding position. The extension piece is welded, the guns shift, and the two hinge reinforcements are welded. The table then lowers and the operator unloads the assembly.

For further information, *write* Federal-Warco Div., McKay Machine Co., Warren, Ohio.

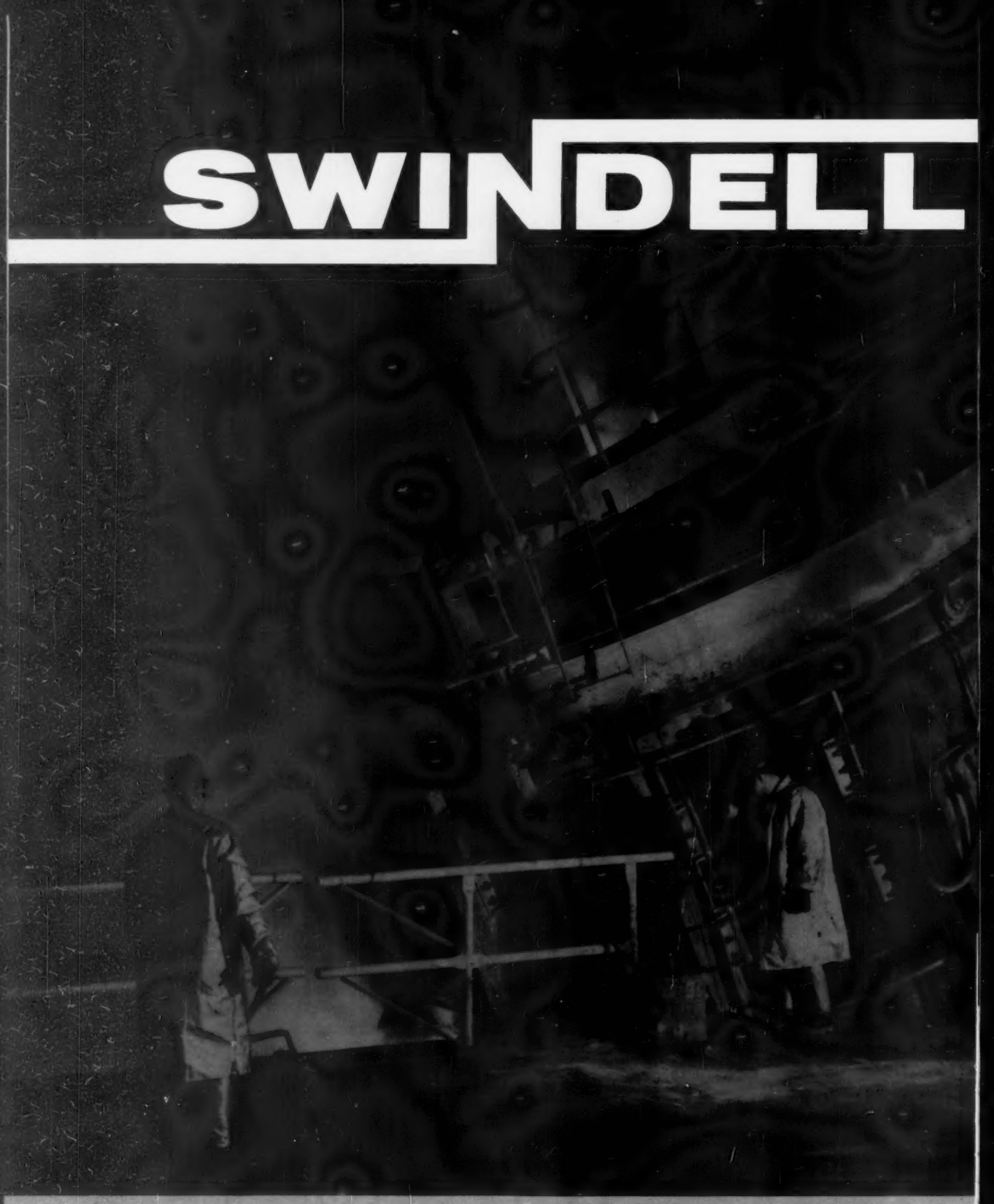
Fingerprint Remover Ends Corrosion Problems

A PREMIUM quality, corrosion preventive, fingerprint remover, Cosmoline 1104, meets government specification ML-C-15074B.

The manufacturer says the ma-

(*Please turn to Page* 122)

SWINDELL



ENGINEERING Swindell-Dressler engineering covers the range of steelmaking requirements from feasibility studies to complete plants and owners' key. Integrated steel mills, basic oxygen steel plants, electric steel melt shops, gas cleaning systems, departmental expansion or remodernization are among the many areas served by this long-experienced metals engineering organization.

ELECTRIC ARC MELTING FURNACES

ADVANCED DESIGN FEATURES—

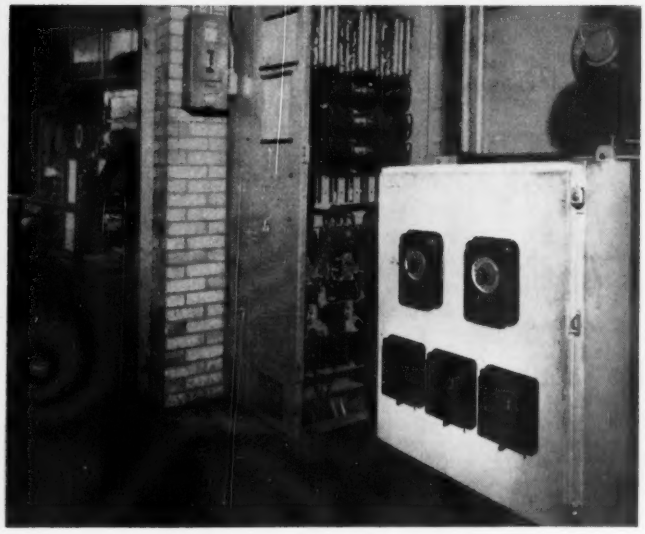
- **3 Point Roof Suspension**
- **Flush Door Mechanism**
- **Remote Roof Cylinder Mounting**
- **Mechanical Tilting**
- **Expendable Shell Panel Construction**

Swindell-Dressler—manufacturer of electric arc melting furnaces for almost 50 years—has pioneered many of the significant advances in this field. Today's Swindell electric arc units embody every modern feature for increased production rates, lower production costs, and improved quality of product. Swindell Electric Arc Furnaces range in capacity from a few hundred pounds capacity to 100 tons and more.

—and Now

AUTOMELT®

Automatic Power Control for Electrode Regulators



- **Lowers Production Costs**
- **Improves Product Quality**
- **Reduces Electrical Consumption**
- **Minimizes Electrode Breakage**
- **Lowers Maintenance**

Swindell-Dressler's new Automelt Automatic Power Control, thoroughly proved in the field, provides the above advantages through efficient and dependable control of power application during melt-down or any phase of the heat cycle. Automelt minimizes occurrence of dead short circuits resulting from scrap shifting or major cave-ins by automatic electrode withdrawal, reclosing the circuit, lowering electrodes and restoring power—all without attention by furnace operators. Automatic high-speed electrode raising in preparation for roof swinging is another valuable Automelt function. Automelt can be adapted to most of today's electrode regulators, and can also be employed in connection with electric arc hot-topping units. Write for details!

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ENGINEERS AND MANUFACTURERS

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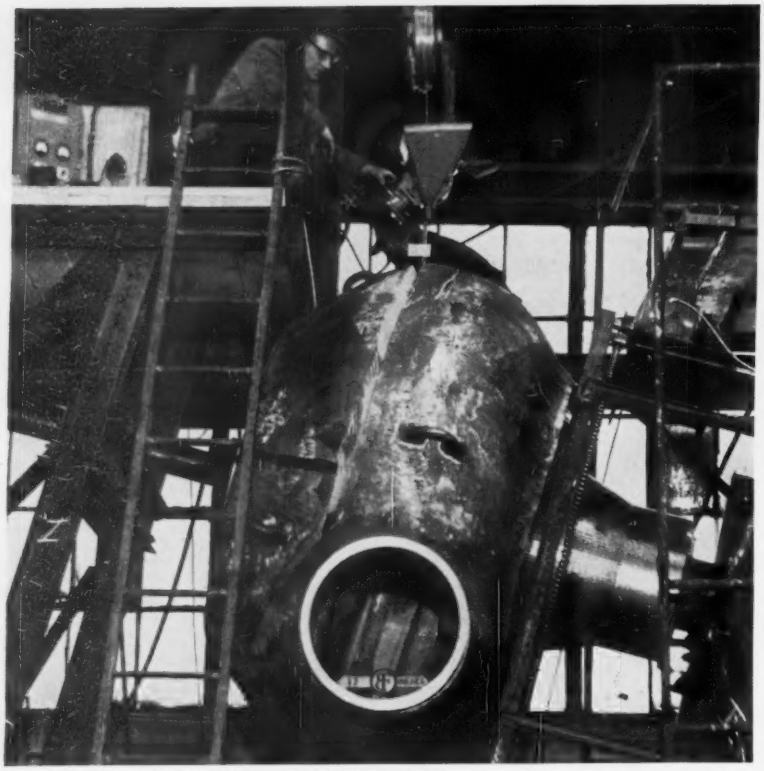
SUBSIDIARY OF PULLMAN INCORPORATED

The SWINDELL-DRESSLER CORPORATION of Canada, Ltd., Toronto, Canada

FOR CONSISTENT QUALITY, WELD WITH ARCOS



Job Report Courtesy of Bonney Floyd Co., Columbus, Ohio

No cutouts in three 4½ inch thick circular submerged arc welds. Fabrication of these boiling water reactor pump housings called for submerged arc welding of two stainless type 18-8 cast sections. After meeting initial side bend test requirements, the 66 passes in *each* casing—from the manual root pass to the last submerged arc pass—met the standard X-ray test for sound weld metal. This is another demonstration of how Arcos quality filler metal products properly used give dependable results time after time.

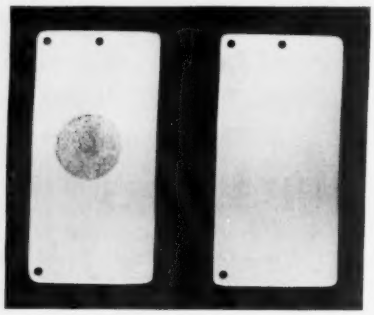
ARCOS

Arcos Corporation · 1500 S. 50th St. · Philadelphia 43, Pa.

NEW PRODUCTS and equipment

(*Continued from Page* 119)

terial is noncorrosive when applied to bimetallic systems, affords protection against rust under high humidity, and suppresses, neutralizes, and removes fingerprints. Corrosives in fingerprints include lactic acid, urea, and sodium chloride.



For further information, *write* E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Resinoid Bond Improves Diamond Wheel Life

A RESINOID bonding method for diamond wheels is said to lengthen wear life. The manufacturer says it's especially adaptable for tool and cutter grinding and that impressive savings have been produced in grinding and regrinding tungsten carbide tools.

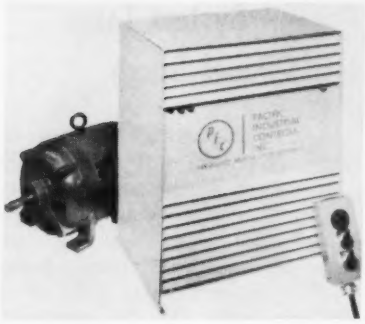
The company's secret: A resinoid bond that chemically attaches itself to the diamonds; each diamond is firmly held until it is worn away.

For further information, *write* Precision Diamond Tool Co., Elgin, Ill.

Motor Speed Controls Are Precise, Efficient

PRECISE speed regulation, simplicity, efficiency, and heavy duty construction are claimed for the Servojust series of motor speed controls.

Units from 1/12 through 1 hp are single phase; above 1 hp they're three phase. They can be easily installed and serviced by regular

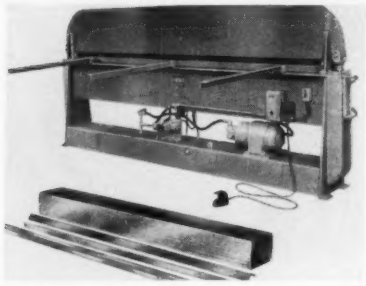


plant electricians. The controls can be supplied with P. I. C./Century motors.

For further information, *write* Pacific Industrial Controls, 1212 Sixth St., Berkeley 10, Calif.

Machine Makes Production Bends in Light Gage Metal

FOUR models of the Chicago Speedibender have been developed for production bending of heating and ventilating duct sections and similar, long, light gage work. The capacities of the units range from 5 ft of 18 gage to 10 ft of 24 gage mild steel.



The setup is powered by two cylinders and a balanced vane type, hydraulic pump driven by a direct connected, 3 hp motor.

For further information, *write* Dreis & Krump Mfg. Co., 7400 S. Loomis Blvd., Chicago 36, Ill.

Variable Speed Drives Boost Mixer Versatility

MECHANICAL variable speed drives have been developed for the Lightnin portable and fixed mounted mixer line. The attachment helps make the mixers more suitable for frequent changes in fluid

BETTER WELDING THROUGH ARCOS SERVICE

Technical assistance from Arcos will help you get the most economical and efficient application of weld metal. By training and experience, your Arcos representative is the man to bring you on-the-job assistance—when and where you need it—backed up by an Arcos team of technicians, researchers, metallurgists and engineers. Depend on your Arcos representative to supply you with the right filler metal for your job. For better welding call on Arcos technical service.

ARCOS

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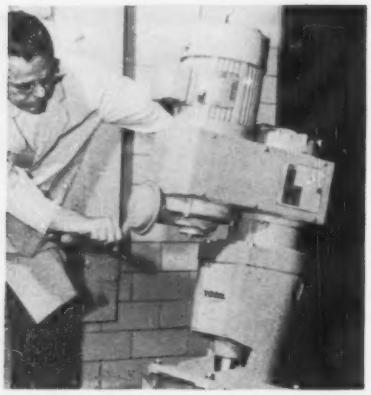


viscosity, varying liquid levels, reduced speeds during tank drainage, closely controlled agitation, and elimination of splashing and aeration.

For further information, *write* Mixing Equipment Co. Inc., 170 Mt. Read Blvd., P. O. Box 1370, Rochester 3, N. Y.

Air Supply Dehumidifier Delivers Dry Air to Pump

A SETUP for dehumidifying plant air supply chills and dries the air before compression. Substantial cost savings are possible with the system, says the maker. The arrangement economically refrigerates (with chilled water) compressor intake air. Any setup using compressed air can benefit, the company adds.

By chilling continuously, a greater weight of air can be delivered to the compressor—a gain of 1 per cent for each 5° F of lowered temperature; up to 13 per cent under summer conditions.

For further information, *write* Lynch Corp., P. O. Box 271, Anderson, Ind.

Unit Quickly Checks Parts For Dimensions, Density

A DEVICE called the Densitron accurately inspects the dimensions and density of symmetrical specimens, automatically accepts or rejects them, and tells the operator how many and why. Readout of all operations is indicated on panels of a control console.

Model 1000 can measure symmetrical objects weighing from 1 to 40 grams having a length of 0.250 to 1.000 in. and a diameter of 0.250 to 0.500 in. Other models can handle objects weighing up to 1 kg and higher. Accuracy is within 0.1 per cent and inspection speed can go up to 1375 parts per hour. Some nonsymmetrical objects can be inspected.

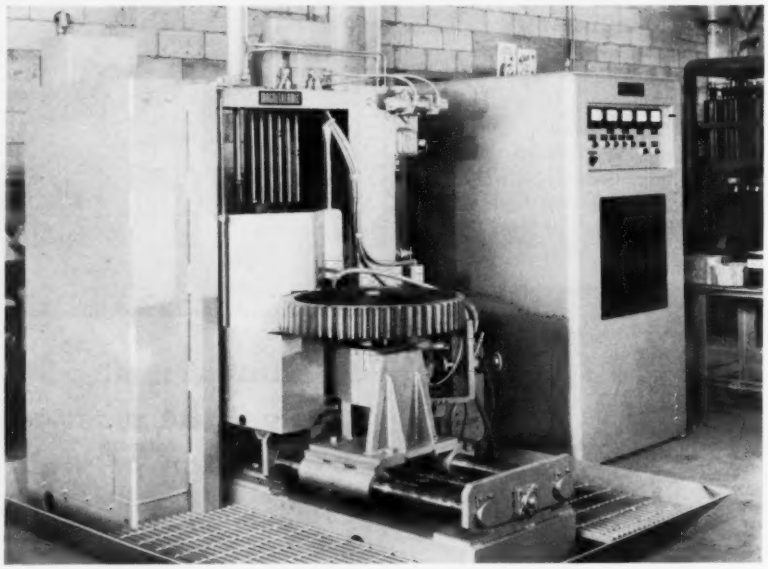
Changes in design specifications of specimens can be introduced into the Densitron in minutes.

For further information, *write* Nuclear Materials & Equipment Corp., Apollo, Pa.

Control System Takes Little Panel Space

YOU can save up to 70 per cent in panel space with a 10 ampere, 300 volt control system available from Square D. Modular design has been used for the basic relays, which occupy the same panel space regardless of the number of poles (two through eight can be specified). The relays can be butted together in rows to form the sides of the wiring troughs.

For further information, *write* Dept. SA, Square D Co., 4041 N. Richards St., Milwaukee 12, Wis.



Unit Hardens Gears Tooth by Tooth

A GEAR HARDENING machine (induction type) being built by Ajax Magnethermic can handle gears up to 180 in. in diameter with up to a 20 in. face. Teeth are hardened one at a time. The manufacturer says the 180 in. machine will require no more high frequency power than the company's 60 in. model. That indicates one of the advantages of the tooth by tooth hardening method where scanning the tooth section is employed.

The method is said to provide close control of hardness pattern, reduce power required, and insure uniform depth. The process produces a hardened zone extending from the tip of one tooth, through the root to the tip of an adjacent tooth.

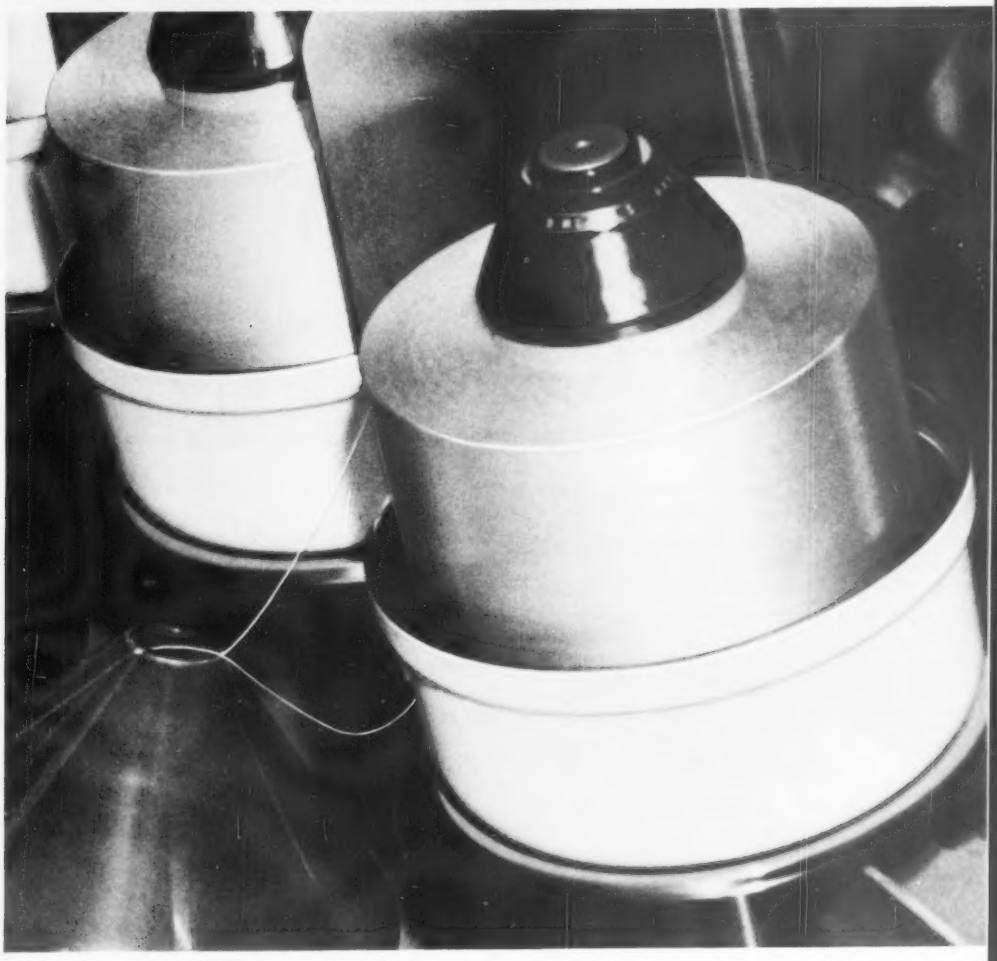
With a limited amount of power in the range of 50 kilowatts, large gears can be hardened, and a surface hardness pattern closely following the contour of the surfaces can be obtained, says the company.

For further information, *write* Ajax Magnethermic Corp., 3100 Simon Rd., Youngstown, Ohio.

working with

Du Pont Delrin®

one of Du Pont's versatile engineering materials



New textile supply buckets of DELRIN® last longer... cost less

Large (10 in. diameter, 1¼ lbs.) buckets economically injection-molded of Du Pont DELRIN acetal resin provide Leesona Corporation, Providence, R. I., with a rugged, long-wearing part for their heavy-duty textile machinery.

Evenly wound packages of filament yarn sit within the buckets of DELRIN (shown above) on a multi-spindle Twister-Coner machine. This machine transfers the yarn from the evenly wound spools to cones at a rate of 340 yards per minute.

The bowl-shaped buckets (molded by Crystal Thermoplastics, Inc., Pawtucket, R. I.) are stationary and thus are subject to abrasion and static build-up by friction of the moving yarn. DELRIN resists both—in fact, outwears phenolic resins previously used—and, in addition, DELRIN maintains its dimensional stability in dry or humid environment.

DU PONT

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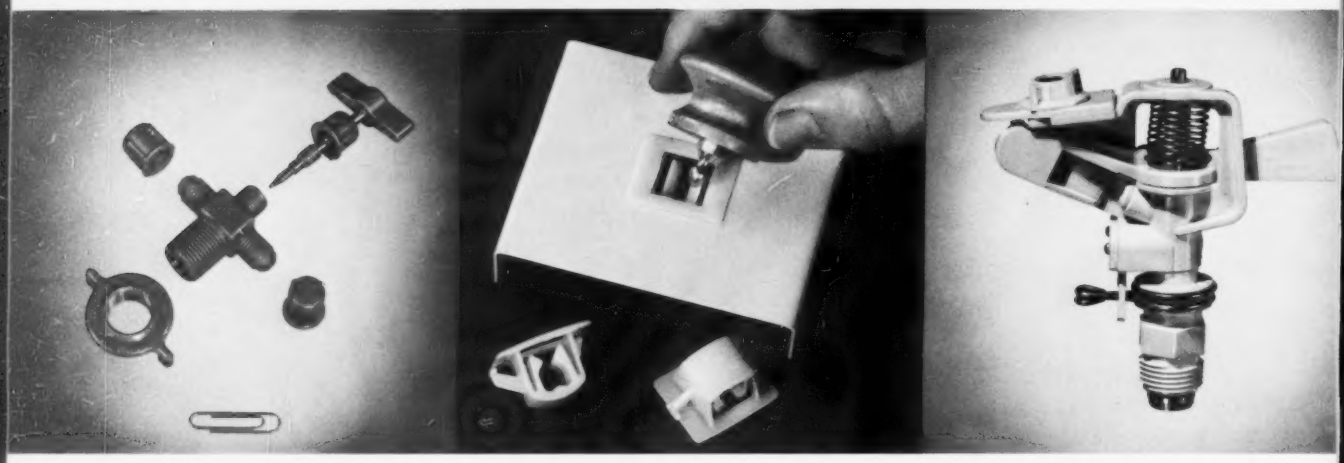
BETTER THINGS FOR BETTER LIVING THROUGH CHEMISTRY

working with

Du Pont Delrin

one of Du Pont's versatile engineering materials



CAN TAP VALVE for use with packaged refrigerant containers is molded entirely of DELRIN except for piercing needle. Molded-in threads are strong and clean; caps fit tightly. Parts molded of Du Pont DELRIN do not corrode and maintain their dimensions under a wide range of temperatures and humidity. (Molded by Industrial Plastic Molders, Inc., for Watsco, Inc., both of Hialeah, Florida.)

CABINET CATCHES molded of DELRIN take advantage of the resilient, spring-like properties of this resin to permit easy installation of the catch and to hold the steel strike. Abrasion and fatigue resistance of DELRIN allow long life under repeated cyclic stressing of the retaining fingers. Its natural lubricity permits steel strike to move smoothly. (Made by Amerock Corp., Rockford, Ill.)

LAWN SPRINKLERS molded of toug Du Pont DELRIN resist abrasion fron sand and silt. DELRIN offers excellen resistance to corrosion and "lime-up" trouble-free service, excellent threa strength. And a choice of colors is mad possible by the integral colors of DELRI acetal resin. (Molded by Lee Deane Pro ducts, Inc., for Plasmet Engineering Co. both of Santa Fe Springs, California.)

DELRIN has strength and toughness

to function reliably under rugged usage. Parts molded of Du Pont DELRIN acetal resin retain a high degree of their mechanical properties under severe environmental conditions, such as high temperatures, moisture, solvents and many corrosive chemicals.

Many designers are taking advantage of the wide range of unique properties of DELRIN, and the substantial cost economies in manufacture and assembly. Why not investigate the possibilities of DELRIN for your product? Mail the coupon below for more information.

POLYCHEMICALS DEPARTMENT

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Nemours Building, Wilmington 98, Delaware

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In Canada: Du Pont of Canada Limited, P. O. Box 660, Montreal, Quebec.

DELRIN® *acetal resins*

are Du Pont's versatile engineering materials

Alathon® · Zytel® · Lucite®

NEW Literature

Write directly to the company for a copy

Valve Sizing

A four page technical paper on valve sizing explains what occurs in undersized, oversized, and correctly sized pressure reducing applications. Jordan Valve Div., Richards Industries Inc., 6013 Wiehe Rd., Cincinnati 13, Ohio.

Cold Extrusion

Some of the ways fabricators can use the cold extrusion process to save on production costs are summarized in an eight page folder. Photos of typical cold extruded parts are included. Ask for Adv. 1290. Republic Steel Corp., 1441 Republic Bldg., Cleveland 1, Ohio.

Aluminum Data Book

The 1961 edition of *The Aluminum Data Book* contains the latest available information on the properties of aluminum and aluminum alloys. The 194 page handbook contains 207 tables of data. It's intended for the engineer and designer working with aluminum. A general section discusses the heat treatable and the nonheat-treatable alloys, thermal practices, alloy selection, fabrication, joining, and surface finishing. Dept. PRD-62, Reynolds Metals Co., Richmond 18, Va.

Cast Iron Soil Pipe

The commercial standard of cast iron soil pipe and fittings, CS 188-59, has been amended to include a specification for 10 ft lengths. Ask for CS 188-59 and amendment No. 1. Cast Iron Soil Pipe Institute, 205 W. Wacker Dr., Chicago 6, Ill.

Wet Dust Collector

How to solve special dust problems with a high efficiency, wet dust collector is explained in Bulletin 920. Pangborn Corp., Hagerstown, Md.

High Strength Steels

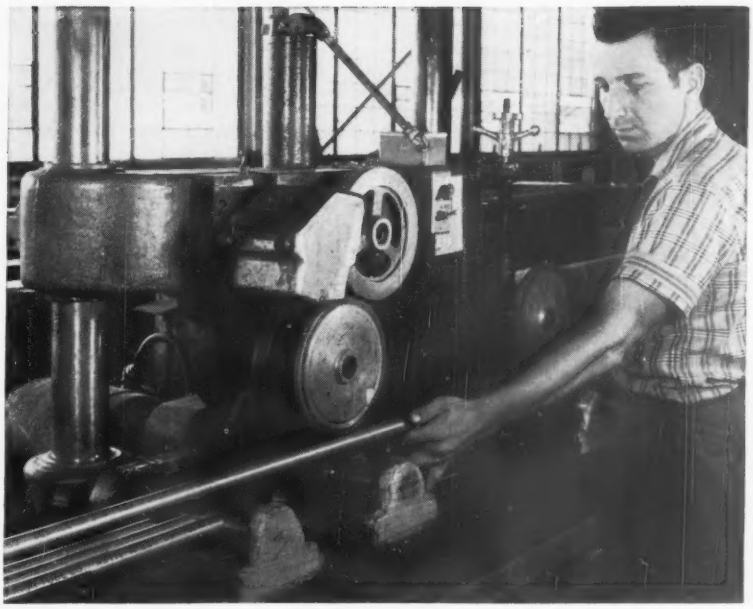
A 12 page booklet on Mar-Aging steels gives detailed data such as composition, heat treatment, fabrication, mechanical properties, and physical properties. Advertising Dept., Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa.

Solenoid Valves

The Solenoid Valve Section of the Fluid Controls Institute has published the *Recommended Voluntary Standards for Procedure in Rating Overflow and Pressure Characteristics of Solenoid Valves.* Ask for Bulletin FCI 61-1. Fluid Controls Institute Inc., P. O. Box 667, Pompano Beach, Fla.

Urethane Foam

Properties, uses, handling, and testing of a Nopcofoam urethane foam for low temperature insulation are described in a 37 page booklet. Request Booklet PSP-103-16. Plastics Div., Nopco Chemical Co., North Arlington, N. J.



This Pannier Offset Bar and Tube Printer at the Superior Tube Company, Norristown, Pennsylvania, is shown marking tubing. The tubing moves from the marker right to a delivery table, ready to bundle for shipment.

MARK BARS, EXTRUSIONS AND TUBING QUICKLY, CLEARLY FOR EASY IDENTIFICATION

The Pannier Offset Bar and Tube Printer marks tubing clearly at a controlled rate of up to 450 feet per minute in a wide range of sizes. It is designed to handle rounds from ⅛″ O.D. to a maximum size of 14″ O.D. Simple adjustments compensate for the various sizes of material to be marked, including flats up to 4″ wide. Adjustable side guide rolls are available as optional equipment to permit printing on flat material from 4″ to 14″ wide.

Top surface printing permits constant inspection. Fast drying inks permit immediate handling. The standard offset printer is right-hand feed; left-hand feed is available to fit your conveyor line system without disrupting present line movements.

This unit (Model 8) will print a 24″ continuous legend; Model 12 will print a 36″ continuous legend using either premolded rubber dies or changeable type, which range in size from 1/16″ to 2½″ characters. Fast type setting saves valuable production time and speeds up deliveries. Printing components, which include the die wheel, printing wheel and drive wheel, are available in three sizes, depending on size of the characters desired. Printing components are quickly and easily interchanged.

The Pannier Offset Bar and Tube Printer is available with a ¾ horsepower variable speed motor, or is friction driven from your existing conveyor for continuous flow materials. Power is applied to the conveyor rolls. Movement of the tubing turns a friction drive wheel which turns the printing head. There is no ink buildup on the offset printing wheel, insuring clear marking.

Pannier also has a small model Offset Wire Bar and Tube Printer, which is recommended for printing materials less than 4″ O.D. Pannier engineers will be glad to consult with you on all your marking problems. For complete information, write:

PANNIER MASTER MARKERS
392 Pannier Building
Pittsburgh 12, Pa.

MASTER PANNIER MARKERS

CIMPERIAL SOLVES GRINDING ROOM PROBLEMS

for parts manufacturer. Another success story for versatile CIMPERIAL, heavy duty cutting fluid of famous CIMCOOL line.

(Company name on request.)

FIELD SERVICE REPORT

and in their grinding department they had all kinds of trouble with the coolant which fed to each machine from a 3,000 gallon central system.

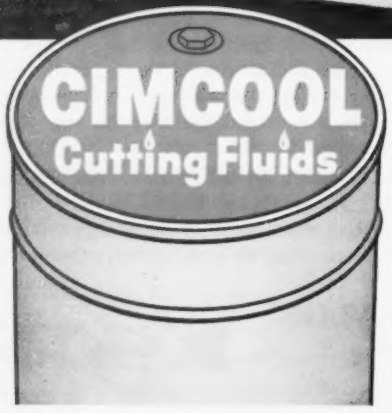
The coolant they were using got dirty and loaded up with grit. It didn't have enough lubricity to give them a good finish. Also, they experienced line clogging, rust and rancidity.

We installed Cimperial at 100-to-1. Right away their finish cleared up. The coolant lines stayed open. No rust or rancidity at all.

And with Cimperial they find they are getting 10 to 15% more pieces with each dressing of the wheel. They sure are happy with that boost in production on top of the other performance improvements.

Bob Hancock

Cleveland Office



FOR 100% OF ALL METAL CUTTING JOBS

Production-Proved products of The Cincinnati Milling Machine Co.

FIVE-STAR CIMCOOL—Newest in the industry-proven line of CIMCOOL° Cutting Fluids.
CIMPERIAL° — Heavy duty replacement for cutting oils in those low-speed tough jobs.
CIMPLUS — The transparent grinding fluid which provides exceptional rust control.
CIMCUT Concentrates (AA, NC, SS) — For every job requiring an oil-base cutting fluid.
ALSO—CIMCOOL Tapping Compound—CIMCOOL Bactericide—CIMCOOL Machine Cleaner.

For full information on the complete family of CIMCOOL Cutting Fluids, call your CIMCOOL Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

°Trade Marks Reg. U.S. Pat. Off.

Steel Buying Accelerates

HEAVY DEMAND for flat rolled products is giving the steel market the biggest boost it has had in weeks and strengthening prospects that December will be the best month of the year.

Orders for cold rolled and galvanized sheets, both used in large quantities by automakers, are climbing rapidly. Bookings for wide, heavy plates are the best that producers have seen all year. Since most of the buying is for January and February delivery, it won't have much impact on December shipments, but it will cause the mills to step up their ingot production. They'll want to have plenty of semifinished material on hand in the early weeks of 1962 so that they can keep their shipping commitments and accept new orders from customers who are planning big inventory buildups.

STRONG AUTOMOTIVE DEMAND—The steel market's resurgence reflects heavy buying by automakers, appliance manufacturers, and other consumers who are stepping up production and adding to their inventories. Automakers are planning to build 634,500 cars this month—more than they've produced in any December since that of 1955. November sales of several producers (Ford Div. of Ford Motor Co. and the Cadillac Motor Car Div. and Chevrolet Motor Div. of General Motors Corp.) were the best ever for the month.

STAINLESS BRIGHTENS—Producers of stainless and heat resisting steels expect their 1961 shipments to equal last year's, even though figures for the first nine months of this year show a 42,000 ton deficit. Strong fourth quarter demand may boost the 1961 total to 575,000 or 580,000 tons. November bookings were sharply above October's. Sheets, strip, plates, bars, and wire are all in stronger demand, so it's apparent that automakers aren't solely responsible. Some users may be building inventories, but the majority are buying because their consumption is going up. They'll start stockpiling steel for strike protection after the first of the year. The inventory buildup, plus strong automotive demand, should push 1962 shipments of stainless and heat resisting steels to a near-record 660,000 tons.

HIGHER CONSUMPTION SEEN—"Our forecasts indicate that every major steel consuming industry will show improvement in 1962 over its 1961 performance," says Leslie B. Worthington, president, U. S. Steel Corp. But he cautions that he expects only "modest" improvement in steel output if users continue to keep tight control of their inventories and buy only as much steel as they consume. Inventories are lower relative to the level of consumption than they have been at any time since pre-World War II years, he believes.

EXPORT OUTLOOK DIM—Imports of steel mill products will exceed exports by about 1.2 million tons this year. We'll have a foreign trade deficit for the third year in a row and a much larger one than we had last year (375,000 tons). The outlook for 1962 isn't good. Exports will probably fall 1 million tons short of imports. If there's a long steel strike, the surplus of imports over exports will be even larger. In 1959, it was 2.7 million tons.

PRODUCTION RISING—Look for ingot production in the week ending Dec. 16 to be slightly higher than the 2.1 million tons that STEEL estimates the industry poured in the week ended Dec. 9. Output then was 1.3 per cent above the previous week's.

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*Current prices were published in the Dec. 4 issue and will appear in subsequent issues.

"Amazing Demonstration of Wire Rope Pliability!"

ACCO'S NEW HI-PLI SLINGS HANDLE LIKE HEMP AND STRAIGHTEN OUT WHEN RELEASED

- ***So pliable it can be tied in knots***
- ***It makes fast, easy work of any lifting job***
- ***It combines the pliability of hemp with the strength of steel***
- ***It's practically kink-proof—and completely free of crankiness***
- ***HI-PLI slings last longer—can be used over and over again***

Twist them, knot them, bend them—and HI-PLI slings always return to their original shape. This amazing pliability comes from ACCO's arrangement of six ropes laid around one. HI-PLI slings also have ACCO's patented Dualoc endings which double-lock the sling ends. They stay clean and pleasant to handle, too—thanks to their durable Galacco finish which resists rust.

HI-PLI slings, like all ACCO slings, are registered safe. This means they have been factory proof-tested at twice load-carrying capacity before they are given an ACCO tag and certificate of registration.

Ask your distributor for Hi-Pli slings or write us at Wilkes-Barre, Pa., for our new Bulletin **DH-532B** giving full details about the Hi-Pli Sling line.

HI-PLI ACCO Registered® SLINGS

Wire Rope Sling Department • American Chain & Cable Company, Inc.

Wilkes-Barre, Pa., Atlanta, Chicago (Melrose Park), Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn. • *In Canada:* Dominion Chain Company, Ltd., Niagara Falls, Ont.

Improved Surfaces Offered On Cold Finished Steel Bars

THREE IMPROVEMENTS to cold finished steel bars are being announced by Bliss & Laughlin Inc., Harvey, Ill., cold finished bar producer.

They are:

- A new, guaranteed limit on surface roughness for each type of bar the firm produces.
- A new, special finish for cold drawn bars. (Luster-Polished.)
- A new, special, superbuffed finish for drawn, ground, and polished; turned and polished; and turned, ground, and polished bars. (Luster-Buffed.)

• **Cost Cutters**—The three improvements are cited by the company as aids for cost cutting in metalworking plants.

"The need for improved appearance of finished parts and the rising cost of machining and secondary finishing operations force users of cold finished steel bars to place more importance than ever on surface finish. The brighter, cleaner, less rough the bar, the lower the cost of converting it into finished components," the company explains.

• **New Plant Opens**—Announcement of the three improvements to product coincided with the dedication of Bliss & Laughlin's new 75,000 sq ft plant at Medina, Ohio (near Cleveland). Costing $2 million, it is the company's seventh facility.

Ability to guarantee surface roughness ratings (rms) is the result of a ten year research and development program.

The rating of surface roughness involves the measurement of the height of finely spaced surface irregularities perpendicular to the nominal surface.

• **Luster-Polished** — The Luster-Polished finish, for applications requiring a smoother surface than can be produced by drawing alone, is produced by polishing (after drawing) to reduce pits and surface roughness to a minimum. A 15 rms maximum surface roughness rating is produced, comparable to that of turned and polished bars.

Luster-Polished bars are used for irrigation pump shafts, hydraulic piston rods, and other components formerly requiring buffing or polishing before plating. When the perfection of surface provided by turned or ground bars is not required for plated parts, Luster-Polished gives excellent results, the company says.

The added polishing operation needed to produce Luster-Polished bars involves a nominal quality price extra.

In some sizes, special accuracy cold drawn can, at extra cost, provide the accurate dimensions of ground bars. The special accuracy product can be used sometimes as a cost saving substitute for ground bars, Bliss & Laughlin points out.

• **Luster-Buffed**—The Luster-Buffed finish is for special applications, particularly plated shafts. Principal application: Hydraulic piston rods, which after plating, must have an extremely smooth surface to assure minimum wear on packings. Luster-Buffed is suitable for other parts, plated or unplated, when high finish and high luster are desired.

To produce Luster-Buffed finish, Bliss & Laughlin uses specially designed equipment to buff the surface to a high luster after turning or grinding and turning and grinding. Maximum roughness surface rating is 5 rms.

Luster-Buffed finish is available on drawn, ground, and polished; turned and polished; and turned, ground, and polished bars in all carbon and alloy grades. Alloy grades are usually specified quenched and tempered. Luster-Buffed finish is also available on Bliss & Laughlin's high strength Strain-Tempered steels, both carbon and alloy.

STEEL "LEFTOVERS" ARE HARD TO EAT UP

. . . yet eat up profits

Steel "leftovers" pile up because you bought in quantity to get a better price and hoped you'd find uses for them . . . or you ordered in quantity for a job which cancelled out half-way through.

How can you avoid "leftover" steel? And its profit-gobbling cost of possession?

Reduce or even eliminate your own inventory . . . let your convenient steel service center carry the inventory. It delivers exactly what you want, just when you want it, unloaded closest to your machines that will use it. Service center also can provide cost-cutting preliminary processing of steel for you . . . shearing, cutting, edging, burning.

Perhaps your accounting and production people don't realize the real *cost of possession* of steel in your inventory? If not, ask your steel service center for the fact-filled booklet, *What's Your Real Cost of Possession for Steel?* Or write us for a copy.

COST OF POSSESSION . . . *to determine your own cost of possession for steel in inventory, consider all these factors:*

Cost of capital: inventory, space, equipment — Cost of operation: space, material handling, cutting and burning, scrap and wastage — Other costs: obsolescence, insurance, taxes, accounting

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STEEL SERVICE CENTER INSTITUTE

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Convenient to every steel user, steel service centers are customer-oriented, technically competent, fully equipped for fast delivery of steel in any type, form, and quantity.

Steel

STEEL SERVICE CENTER INSTITUTE

Texas Steel Imports Check Domestic Output

The flow of foreign steel into Texas is hurting domestic production. Figures for October showed 48,614 tons were imported—almost 38,000 tons from Belgium.

The total was up from September's 35,000 tons. In October, 1960, only 16,000 tons came in.

The flood of foreign material is expected to discourage an inventory buildup in the Southwest. Users are thought unlikely to become much concerned about a possible midyear strike in the domestic steel industry when they are being besieged to buy low priced imported material.

Steel Bars . . .

Bar Prices, Page 140

Moderate improvement in demand for carbon steel bars is reflected in a slight extension of some mill deliveries, particularly in the Midwest. A pickup in automotive requirements is having a salutary effect, but more active diversified consuming demand is also a factor contributing to delivery stretchout.

In general, rolling cycles run not much over 30 days, and further extension is not likely until after the turn of the year in both hot rolled and cold finished bars. Consumers are ordering more actively for shipment in January and beyond. Users' efforts to hold down inventories for tax purposes is a factor working against active December shipments.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 141 & 142

Steel ordering is accelerating. The greatest strength is in the flat rolled products, and demand in those grades is strongest in cold rolled sheets, long terne sheets, galvanized sheets, tin plate, and wide, heavy plates.

In general, while mill sheet deliveries are tightening a little, they still are on the easy side. It's still possible to obtain hot rolled sheets in two to three weeks and cold rolled in two to five. Shipments of galvanized sheets, however, are firming up again following a lag during the fall. This is ascribed to a pickup in auto specifications, a lift that will probably carry producers into the spring construction

period. Some leading galvanized sheetmakers are booked through January.

Only a small amount of new orders is for December delivery, some commitments extending into May. The buying wave is spearheaded by automotive needs, but other consumers are beginning to enter the market. Inventory building rather than improvement in consumption is sparking buying activity. Some automakers have indicated they'll build inventories in the January-May period.

Emco Porcelain Enamel Co. Inc., Port Chester, N. Y., booked a contract for steel (40,000 clothing lockers) at $548,500 from the Quartermaster Depot, Richmond, Va.

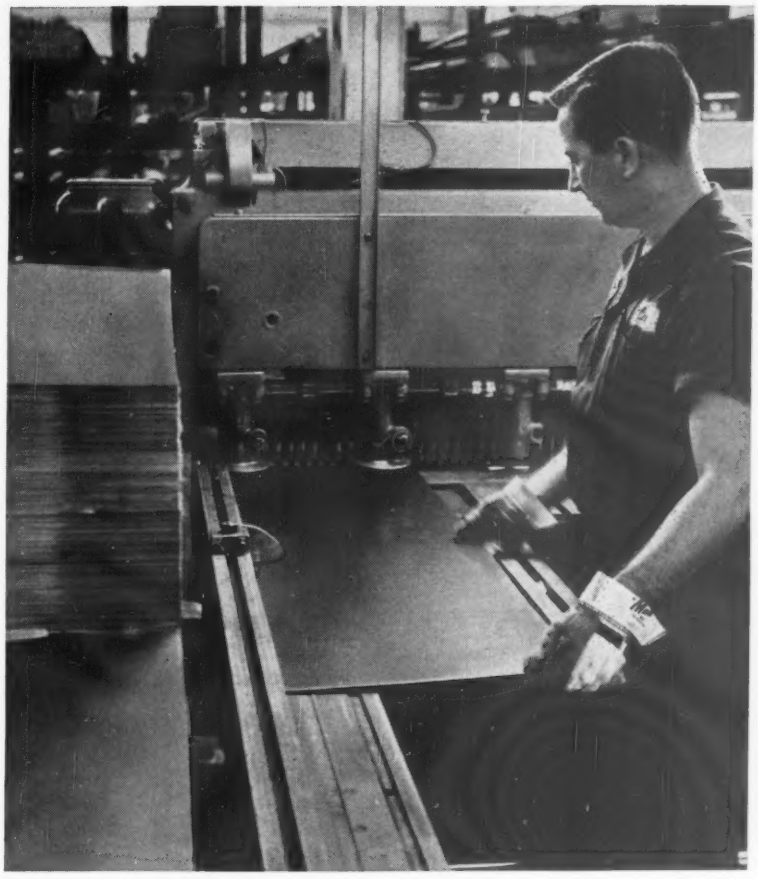
Puget Sound Distributors Seek Freight Rate Relief

Decision on a plea of Puget Sound steel service centers and steel users for reduced railroad freight rates on tonnage from California and Utah mills is expected next month. At a hearing in Seattle Nov. 29, the carriers were asked to lower rates $2.20 a ton from Geneva, Utah, and $1.80 a ton from Pittsburg and Fontana, Calif.

Arguments were persented on behalf of the Seattle Traffic Association, Tacoma Chamber of Commerce, and groups in Snohomish and Whatcom Counties, Washington. The arguments, heard by W. R. Watson, chairman, North Pacific Coast Freight Bureau, will be presented to a joint meeting with the Pacific Southcoast Freight Bureau at San Francisco during the week of Jan. 22. Harold E. Stack, Stack Steel & Supply Co., headed the Seattle group.

Parity rate proponents stressed the injustice of lower rates to Spokane, a longer haul than to Puget Sound, adding that business would be diverted to trucks if rail rate relief were not granted. The differential of 6 cents, they stated, was not too great to keep business from the trucks, considering the more frequent service of the trucks.

The request for rate parity was endorsed by representatives of Puget Sound Bridge & Dry Dock Co., National Steel Construction Co., Todd Shipyards, Boeing Co., Isaacson Iron



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. . . problem-solving benefit offered by your steel service center

Have you ever considered how many ways your steel service center can help a business like yours? Their operations are customer-oriented . . . they have plenty of experience with metal fabrication processes, joining methods, layout and design problems and machine-tool scheduling. Chances are, metallurgical know-how available from the steel service center will be helpful to you, too.

The metalworking-minded salesman and the experienced people who back him up at the steel service center can be mighty helpful to you, whether you're "small business" or in FORTUNE'S Top 500. Pre-delivery fabricating services from steel service centers are cost-cutting-helpful, too . . . slitting, burning, bending, sawing, edging, and leveling.

Use the steel service center's counsel and facilities, as well as their ability to cut your *cost of possession* of steel . . . painless way to improve your profit picture and your product.

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Steel

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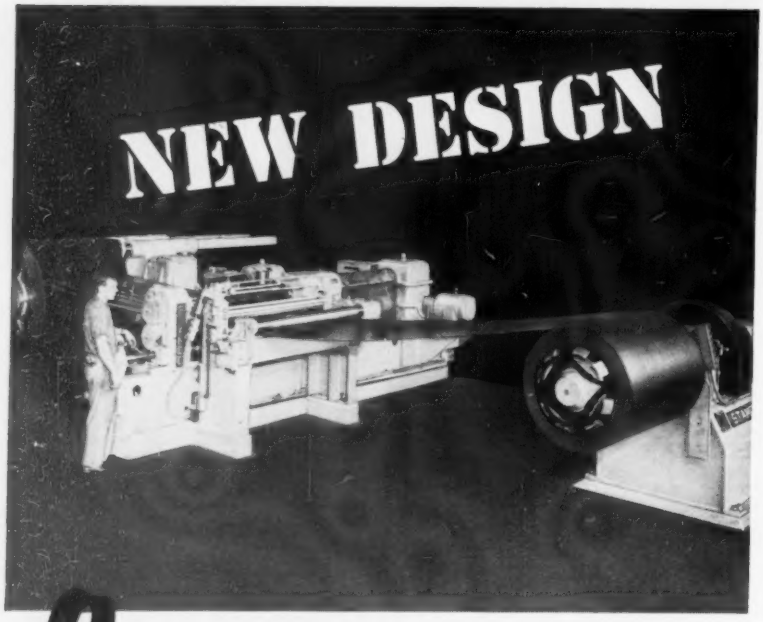
Works, firms in Tacoma, Bellingham, and Everett, and two state agencies, Utilities & Transportation Commission, and the Department of Commerce & Economic Development, as well as the city governments of Seattle and Tacoma.

Charles Knight, traffic manager, Kaiser Steel Corp., Oakland, Calif., said the Kaiser company favored rail shipments from Fontana, but that trucks were hauling half of the mill's output. About 20 per cent of Southern California manufacturers who buy steel from Kaiser have no rail connections.

Distributors . . .

Prices, Page 147

Steel service centers are booking orders steadily, but they anticipate a letdown late this month because of the holidays. Heavier buying by consumers from the mills and prospects for still more active demand early next year are causing some distributors to show more interest in accumulating larger inventories.



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Unit will handle coils of 20 thousand pounds maximum weight with a maximum width of 52 inches. Attractively priced. Contact our specialized sales representatives for complete information.

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I. W. Spraitzar, 159 Main Street, Chatham, New Jersey
W. E. Heineman, 122 West Burlington Ave., LaGrange, Illinois
W. H. Millan, 11955 Shaker Boulevard, Cleveland 20, Ohio

Prices on Bismuth and Lead Tellurides Cut

Prices on bismuth and lead tellurides (basic materials used in the production of thermoelectric devices) were cut about one-third by Alloys Unlimited Inc., Long Island City, N. Y. The company quotes under $50 per pound in large production quantities. Last June, the materials were quoted at $150 to $400 per pound. The company produces lead and bismuth tellurides of two types: p and n.

Tubular Goods . . .

Tubular Goods Prices, Page 146

Demand for commercial pipe is seasonally slow, with deliveries easy. Most pipe mills can supply material from stock. No appreciable pickup in consuming demand is anticipated until the first quarter next year.

Rotary oil rig operations in the U. S. and Canada declined during the latest week of record. Hughes Tool Co.'s survey showed 1891 rigs at work in the U. S., down 14 from the preceding week. In Canada, 136 rigs were reported operating, off 24 from the week before. The two nation tally of 2027 active rigs was 50 above the total in the same week a year ago.

Plates . . .

Plate Prices, Page 140

Heavier buying of plates is reported. Midwestern mills are booked through January on wide and heavy plates, and further extensions are expected. Sheared and universal plates are still available for shipment in two to three weeks, but some producers have little tonnage to offer under three weeks. Alloy plates are being offered for four to six week delivery.

Some signs of buying for inventory are noted, but so far purchases are largely for current needs. Freight car building is picking up, but it hasn't been translated into plate tonnage. Demand for plates for pipeline work is relatively feeble.

The contract for construction of a nuclear powered attack submarine has been placed with the Fore River Shipyard of Bethlehem Steel Co. Three New England shipyards are building this type sub. The work

should mean heavier demand for alloy plates, largely grade Hy-80.

Barrel, Drum Shipments Slow Down in September

The movement of steel shipping barrels and drums in September totaled 2,598,627 units, off 11 per cent from the August total and 2 per cent below that for September, 1960, reports the U. S. Census Bureau. The cumulative total for the first nine months this year was 23,582,767 units vs. 23,168,244 in the same period last year.

Shipments of 6,380,015 pails in September were 12 per cent below August deliveries, and 7 per cent below the total for September, 1960. The total movement for the first nine months this year was 58,231,639 units vs. 55,659,231 in the same period of 1960.

Wire . . .

Wire Prices, Pages 142 & 145

Buying of manufacturers' wire is a shade livelier, but delivery promises continue in much the same range as formerly, one to five weeks, depending upon the processing required. Merchant wire products are readily available from stock.

Some wiremakers report orders for drawn wire and rods for shipment over the first quarter are slightly heavier. Consumer stocks are low, and some users of manufacturers' wire and specialties are covering their requirements for the entire first three months of next year. Deliveries will be taken as required. Such arrangements are made possible by the availability of prompt tonnage, expected during the quarter. More rod tonnage is being booked on the same basis.

A coil of shoe staple wire that holds 12 times more than conventional, 5 lb coils is being made available to shoe manufacturers and supply houses by Prentiss Wire Mills, Riverside-Alloy Metal Div., Riverside, N. J., H. K. Porter Company Inc. The 60 lb coils cut roll downtime.

Structural Shapes . . .

Structural Shape Prices, Page 140

Most structural fabricators have sufficient tonnage on their books to carry them into next spring. Individual shop backlogs vary, however, reflecting the price fighting that has prevailed this year. Despite the moderate weather of recent weeks, structural activity is slowing down seasonally. The outlook for 1962 is fairly promising, active demand on public account for highways, bridges, schools, and similar structures being in prospect.

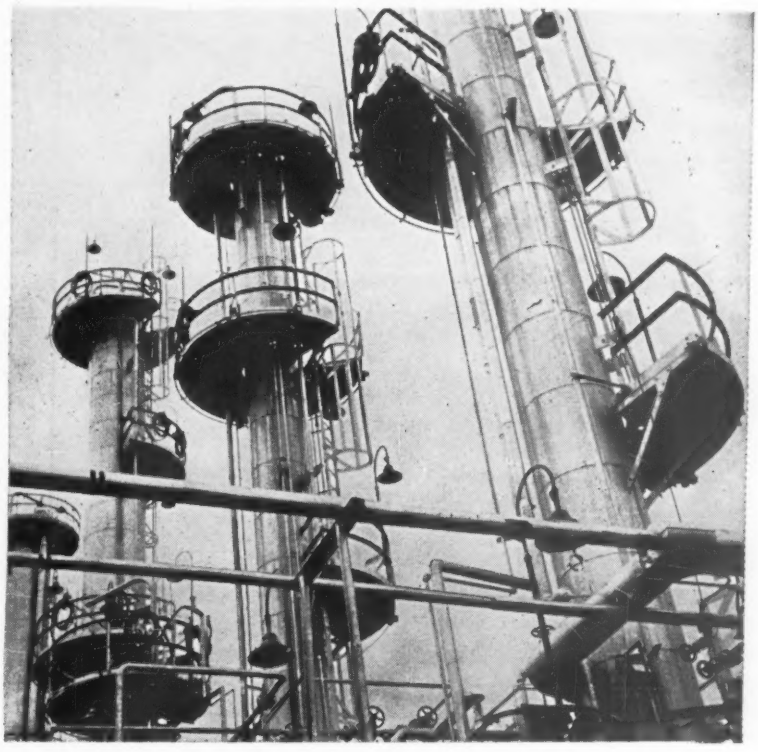
Current buying of structural material is restricted, fabricators apparently confining purchases to needs in sight. Wide flange shapes are readily available for delivery in two to four weeks. Standard shapes are in even freer supply.

Phoenix Steel Corp. is now rolling 10 in. wide flange beams on its structural mills at Phoenixville, Pa. Special rolls designed by Phoenix and Blaw-Knox Co. made possible the production of the larger size.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3450 tons, state bridgework, Hackensack, N. J., Route 3, Sec. IC, to Phoenix Bridge Co., Phoenixville, Pa.



Industry's main arteries

Stainless steel pipe and tubing carry the lifeblood of industry —particularly in the chemical and petrochemical fields.

Kobe Steel's extruded pipe and tubing, are entirely seamless and completely dependable whether made of steel or alloy steel. Uniform in quality, they have great resistance to extremes in temperature and pressure.
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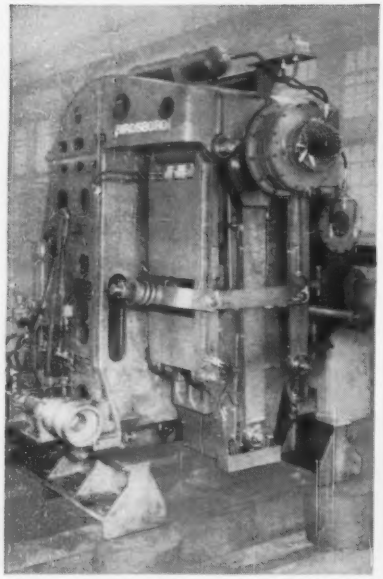
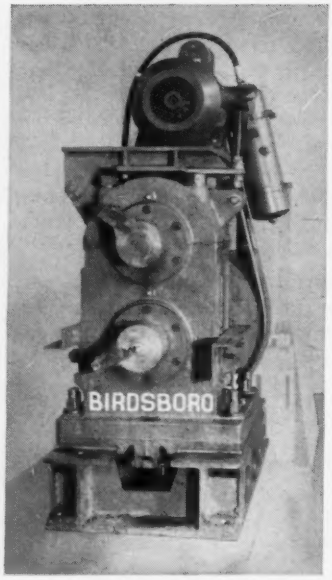
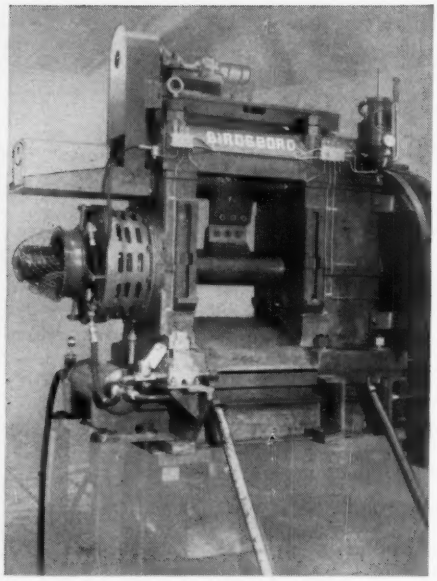
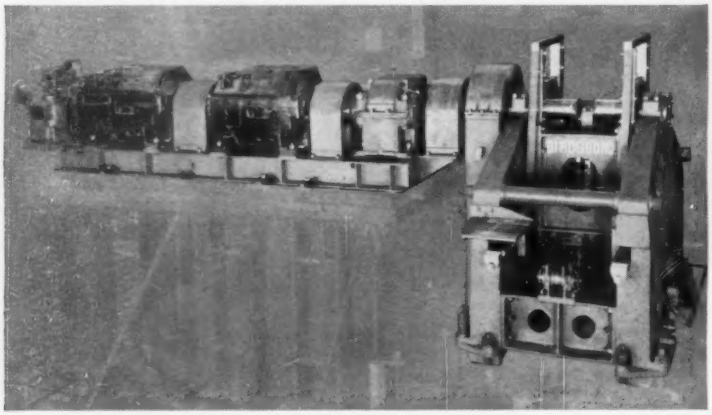


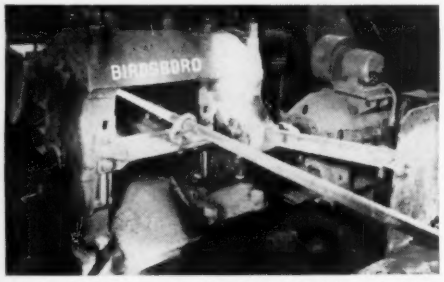




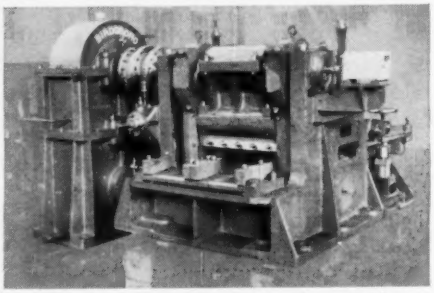
(Left) Pendulum type Flying Shear has an air clutch and brake on both swing and cutting drives, cuts 2¼" square billets at 600 FPM. The Shear is mounted on ways and is aligned with the pass by a motor drive, and clamped in place hydraulically. (Center) Overhung Flying Crop Shear has an air operated clutch and brake type flywheel drive with motor mounted on top of shear, reducing floor space to a minimum. Shear crops front and back end of ovals with areas up to .292 sq. in. at 800 FPM. The Shear is mounted on ways and is aligned with the pass hydraulically. (Right) Enclosed knife, air operated clutch and brake type flywheel drive, Cooling Bed Flying Shear divides 1 3/16" rounds at 2000 FPM at 10 cuts per minute.



Direct drive Flying Shear has a sliding knife frame assembly; cutting action is up and down, with clamping gag, giving square and distortion free cut at speeds of 100/400 FPM; bar is cut into twenty foot lengths.



Enclosed knife, single strand, direct drive, 25 H.P. variable voltage motor operated Flying Crop Shear; crops front and back end of 27/32" square bars at 415 FPM.



Pendulum type, direct drive Swing Shear divides up to 18 sq. in. billets emerging from furnace.

FLYING CROP AND DIVIDING SHEARS

designed and built by

MM 7-61

BIRDSBORO CORPORATION BIRDSBORO, PENNSYLVANIA

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • ROLLS • ELECTRIC STEEL CASTINGS: Carbon, Low Alloy and STAINLESS STEEL

DIVISIONS: **MIRAWAL DIVISION • CHEMICAL MACHINERY DIVISION**

2000 tons, 21 story furniture mart, Lexington Avenue and 33rd Street, New York, through John Campagna, owner and builder, to Bethlehem Steel Co., Bethlehem, Pa.

1650 tons, state bridgework, FAGCP 61-6, Queens County, New York, through Gull Construction Co., New York, general contractor, to Irvington Steel & Iron Works, New Brunswick, N. J.

1200 tons, central laboratory and office (government), Huntsville, Ala., through G.M.F. Construction Co., New York, to Chicago Heights Steel Co., Chicago Heights, Ill.

753 tons, state bridgework, FAGCP 61-4, Queens County, New York, through De Lilio Construction Corp., New York, to American Bridge Div., U. S. Steel Corp., Pittsburgh.

500 tons, William Black Hall of Nursing, Lenox Hill Hospital, New York, through Psaty & Fuhrman, general contractor, to Lehigh Structural Steel Co., Allentown, Pa.

360 tons, subway alterations, Brooklyn, N. Y., through Horn Construction Co., general contractor, New York, to Bethlehem Steel Co., Bethlehem, Pa.

256 tons, W. T. Woodson High School, Fairfax, Va., to Liphart Steel Co., Richmond, Va.; Thorington Construction Co. Inc., Richmond, general contractor; also, 39 tons of concrete reinforcing bars were placed with Thomason Steel Co., Richmond.

STRUCTURAL STEEL PENDING

9917 tons, state bridgework, FAYWE 61-5, Queens County, New York; bids Dec. 21.

9000 tons, transmission towers, Trinity project, Northern California; bids in.

7000 tons, Federal General Services Administration Bldg., Pittsburgh; bids Dec. 19.

5000 tons, state bridgework, FASS 61-10, Erie County, New York, DePew Paving Co. Inc., Syracuse, N. Y., low on general contract.

4117 tons, state bridgework, Sec. 5-R, Saddle Brook, N. J., Poirier & McLane, New York, low on general contract.

2820 tons, state bridgework, FAGCP 61-5, Queens County, New York, Merritt-Chapman & Scott, New York, low on general contract.

2460 tons, state bridgework, FARC 61-168, Broome County, New York; bids Dec. 21.

2350 tons, state bridgework, NDE 61-5 and FARC 61-129, Niagara County, New York; bids Dec. 21.

2077 tons, state bridgework, project 727, Stark and Summit Counties, Ohio.

1920 tons, state bridgework, Route 95, Spotsylvania County, Virginia, T. A. Loving & Co., Box 129, Goldsboro, N. C., low on general contract.

1856 tons, state bridgework, PSC 66-38 and PSC 72-96, Suffolk County, New York; bids Dec. 21.

1800 tons, also 50 tons of steel pipe, Lower Monumental Dam, Snake River; bids to U. S. Engineer, Walla Walla, Wash., about Feb. 1; bid call about Dec. 15.

1633 tons, state bridgework, LR 1005 (5-7), Lackawanna County, Pennsylvania, Reed & Kuhn, Philadelphia, low on the general contract.

1500 tons, 20 story office building, 44th Street and Second Avenue, New York, Depot Construction Co., New York, owner and builder.

1420 tons, state bridgework, FIC 61-22, Albany County, New York; bids Dec. 21.

1350 tons, building, Anaconda Aluminum Co., Columbia Falls, Mo.; bids closed.

1260 tons, state bridgework, FALIE 6-5, Suffolk County, New York; Hendrickson Bros., contractor, low on general contract.

1000 tons, Meadowbrook Hospital, East Meadow, N. Y. (previously reported as East Meadowbrook), Laurence J. Rice, Huntington, N. Y., low on general contract.

1000 tons, municipal assembly center, Tulsa, Okla., bids postponed to Dec. 5.

823 tons, state bridgework, Route 80, Sec. 4G, Paterson, N. J.; bids closed.

704 tons, angles, Navy, Military Industrial Supply Agency, Philadelphia (two contracts); bids Dec. 19.

393 tons, state bridgework, FISH 61-21, Onondaga County, New York; D. W. Wingleman Inc., Buffalo, low on general contract.

350 tons, Washington State, Roanoke Interchange, Seattle; bids to Olympia, Wash., Dec. 21.

340 tons, Montana State underpass, Billings, Mont.; general contract to Schultz & Lindsay, Fargo, N. Dak., low at $1,043,348.

226 tons, state bridgework, Route 295, Sec. 2E, Camden County, New Jersey, bids Dec. 20; also, 655 tons of reinforcing steel required.

205 tons, Washington State highway project, Kittitas County; bids to Olympia, Wash., Dec. 21.

200 tons, National Drug Research Bldg., Swiftwater, Pa.

102 tons, state bridgework, FARC 61-163, Delaware County, New York; bids Dec. 21.

REINFORCING BARS . . .

REINFORCING BARS PENDING

3600 tons, Lower Monumental Dam, Snake River, Wash.; bids about Feb. 1 to the U. S. Engineer, Walla Walla, Wash.

1700 tons, Washington State, Roanoke Interchange, Seattle; also 215 tons of sheet piling; bids to Olympia, Wash., Dec. 21.

1298 tons, Navy, Bureau of Yards and Docks, Port Hueneme, Calif., to Materials Inc., Cleveland.

655 tons, state bridgework, Route 295, Sec. 2E, Camden County, New Jersey; bids Dec. 20; also, 226 tons of structural steel required.

500 tons, 16 in. concrete cylinder water supply pipe, Baker, Oreg., to American Pipe & Construction Co., Portland, Oreg.

400 tons, Washington State, Roanoke Expressway, two bridges, Seattle; N. Fiorito Co., Seattle, low bidder at $798,557.

265 tons, also 1075 ft of steel piling, Idaho State, Bingham County underpass; bids to Boise, Idaho, Dec. 19.

205 tons, Idaho State, Bingham County underpass; bids to Boise, Idaho, Dec. 19.

175 tons, Washington State, Kittitas County bridge; bids to Olympia, Wash., Dec. 19.

PLATES . . .

PLATES PLACED

600 tons, 17,000 ft of 24 in. water supply pipe, Port Alberni, B. C., to Dominion Bridge

"MISSISSIPPI LIME HAS THE LEAST OF WHAT WE DON'T WANT"

Vast deposits of limestone unusually low in silica, phosphorus, sulphur and all other impurities harmful to steel. Strict control of mining and processing. Immediate shipment in any quantity anywhere by barge, by rail, by truck.

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Common Stock

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Price $34 per share

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Stone & Webster Securities Corporation — White, Weld & Co. Incorporated — Dean Witter & Co.

Co., Vancouver, B. C.

500 tons, transmission line for Baker, Oreg., to American Pipe & Construction Co., Portland, Oreg., for concrete cylinder pipe.

250 tons, 4000 ft of 12 and 18 in. supply pipe for West Vancouver, B. C., to Armco Steel Corp., Middletown, Ohio.

190 tons, 1.5 million gallon standpipe, King County District No. 64, Seattle, to Chicago Bridge & Iron Co., Seattle, low at $87,521.

190 tons, pipe caissons, Norfolk, Va., through De Long Corp., New York, general contractor, to Posey Iron Works Inc., Lancaster, Pa.

170 tons, platework, Belmont filter plant, Philadelphia, through Nalan Construction Co., general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

160 tons, Naval Shipyard, Portsmouth, N. H., to U. S. Steel Corp., Boston.

PLATES PENDING

1750 tons, cofferdam, etc., Lower Monumental Dam, Snake River; bids to U. S. Engineer, Walla Walla, Wash., about Feb. 1; bid call about Dec. 15.

1200 tons, 38,700 ft of 26 and 42 in. water supply line; bids in at Vancouver, B. C.

1200 tons, liners for sludge tanks, Owls Head sewage disposal plant, New York; bids closed Dec. 5.

1000 tons, including shapes (estimated), two 430 ft, steel freighters for coastwise service; bids to Olympic-Griffiths Lines, Seattle, Jan. 31.

Ingot Output Moves Up

STEELMAKING operations are at the highest level since the last two weeks of September and the first week of October. Production during that period reached the peak for the year to date.

Output for the week ended Dec. 9 is estimated at 2.1 million tons, a gain of 1.3 per cent over the previous week's total.

The rise in production is supported by heavier bookings, although a few customers are requesting deferment of some shipments until after Jan. 1 for tax purposes. Many mills anticipate a possible shortage of rolling capacity and lengthening of delivery schedules in the first quarter.

• **Youngstown**—Mills advanced the operating rate 2 points to 61 per cent of 1960 capacity for the week ended Dec. 9. Republic Steel Corp. started up one open hearth and a bessemer converter which had been idle for several weeks. Youngstown Sheet & Tube Co. placed an open hearth in operation at its Brier Hill Works after having taken off one unit in the preceding week.

• **Chicago**—Steelmaking was scheduled at an estimated 80 per cent of 1960 capacity for the week ended Dec. 9, a gain of 3 points. It is the highest rate since the last week in April, 1960, when a pace of 81.5 per cent was recorded. The rise in production is a direct reflection of sharply rising volume of steel orders.

• **Birmingham** — The steelmaking rate for the Birmingham-Gadsden-Atlanta area of the Southern district rose about 1 point during the week ended Dec. 9 to 64 per cent of the 1960 rated ingot capacity.

• **Pittsburgh** — District steelmaking operations held at about 70 per cent of 1960 capacity for the week ended Dec. 9. Production in the week ended Dec. 2 was 415,655 tons, unchanged from the previous week's output.

• **Buffalo** — Steel operations continue unchanged at about 54 per cent of 1960 capacity. Mill operators are fairly optimistic about prospects for December. They plan to turn out more steel ingots than current orders for finished material warrant because they want to stockpile some finished products for an expected jump in demand in the first quarter.

• **Philadelphia**—Steel buying is accelerating, with a definite pickup in orders for stock. Demand is spearheaded by automotive specifications for sheets which are stimulating activity in other lines.

• **Detroit**—Ingot production continued active during the week ended Dec. 9 and is expected to be maintained through the balance of the year. Incoming orders from the automotive and appliance industries are piling up for January delivery.

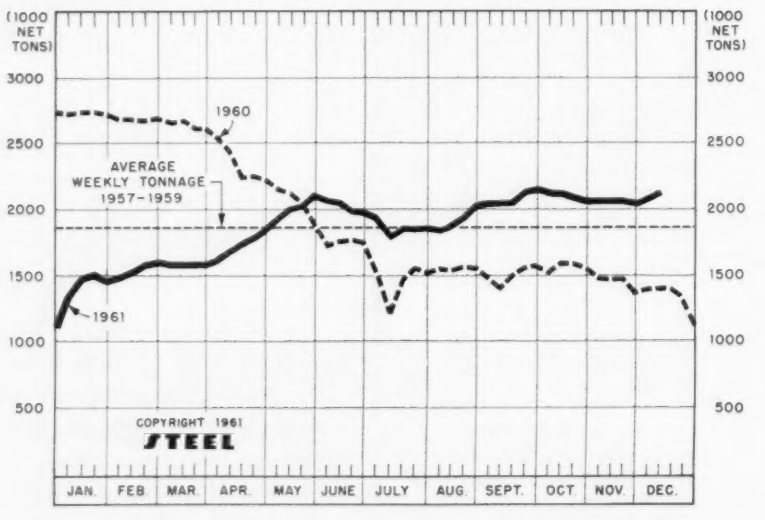
• **Cincinnati** — Steel production, pushed along by vigor in auto buying, continues in the mid-80 per cent range. Two area mills are running close to 100 per cent.

STEEL INGOT PRODUCTION

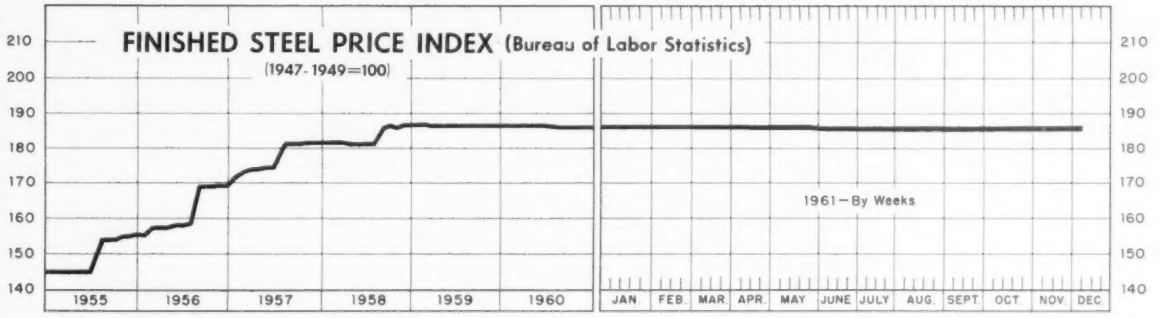
Weeks Ended	Net Tons	Change
Dec. 9	2,100,000*	+ 1.3%
Dec. 2	2,073,000	+ 2.0%
Nov. 25	2,032,000	— 0.2%
Totals to Dec. 2		
1961	88,953,000	— 4.6%
1960	93,202,000	

DISTRICTS	Week Ended Dec. 2 Tons‡	Week Ended Dec. 2 Index†	Week Ended Nov. 25 Index†
Northeastern	285,900	107	105
Buffalo	99,302	102	104
Pittsburgh	415,655	103	103
Youngstown	159,782	94	92
Cleveland	97,225	105	104
Detroit	162,621	155	150
Chicago	445,150	119	113
Cincinnati	100,289	133	139
St. Louis	70,943	135	129
Southern	111,648	103	97
Western	126,266	108	106
Industry	2,073,000	111.3	109.1

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Dec. 5, 1961	Week Ago	Month Ago	Nov. Index	Year Ago
185.4	185.4	185.4	185.4	186.2

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Dec. 5

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	(N.A.)
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.643
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.225
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.460
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv. Buttweld (100 ft)	23.098
		Pipe Line (100 ft)	195.423
		Casing, Oil Well, Carbon (100 ft)	193.028
		Casing, Oil Well, Alloy (100 ft)	302.645
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	192.285
		Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, 8d Common (50 lb)	4.715
		Wire, Barbed (80-rod spool)	8.372
		Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Dec. 6 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	225.92
Index in cents per lb	6.713	6.713	6.713	6.713	6.111

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$137.66
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	62.63
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	62.18
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	63.41
Steelmaking Scrap, GT	34.33	33.67	33.00	28.92	66.27

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Dec 6 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	5.075
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	5.075
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.98	5.35
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.85
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	5.00
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	5.00
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.745	5.40
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.85
Plates, Chicago	5.30	5.30	5.30	5.30	4.85
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	5.25
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.85
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.75-5.85
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	6.30
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.95
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	7.20
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	8.20
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.95

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$91.50
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	5.80

PIG IRON, Gross Ton	Dec. 6 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$63.50
Basic, Valley	66.00	66.00	66.00	66.00	62.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.18	66.26
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	63.00
No. 2 Frdy, Chicago	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.68	66.76
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	59.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	66.70
Malleable, Valley	66.50	66.50	66.50	66.50	63.00
Malleable, Chicago	66.50	66.50	66.50	66.50	63.00
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	235.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$35.50	$34.50	$33.50	$26.50	$66.50
No. 1 Heavy Melt, E. Pa.	34.00	34.00	34.00	34.00	63.00
No. 1 Heavy Melt, Chicago	33.50	32.50	31.50	25.50	69.00
No. 1 Heavy Melt, Valley	36.50	33.50	36.50	26.50	66.50
No. 1 Heavy Melt, Cleve.	33.50	30.50	32.50	23.50	65.00
No. 1 Heavy Melt, Buffalo	27.50	27.50	29.50	23.50	60.50
Rails, Rerolling, Chicago	58.50	56.50	57.50	46.50	89.00
No. 1 Cast, Chicago	41.50	39.50	39.50	36.50	50.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.50
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	17.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	29.50

Steel Prices

Mill base prices reported to STEEL, Dec. 6, cents per pound except as otherwise noted. Code number following mill point indicates producing company. Key to producers, page 141; footnotes page 145. *Changes shown in italics.*

SEMIFINISHED

INGOTS, Carbon Forging (NT)

Munhall,Pa. U5 .....$76.00

INGOT, Alloy (NT)

Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rolling (NT)

Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)

Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 ..99.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 .....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)

Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32 .119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ...119.00
Conshohocken,Pa. A3 .121.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2 .119.00
LosAngeles B3 .....139.00
Lowellville O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14.119.00
S.Duquesne,Pa. U5 ...119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14.122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP

Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. P5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ..5.05

WIRE RODS

AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 .6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Buffalo S47 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2 W14 .6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ...6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1 5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 .....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange

Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2 .5.50
Lackawanna,N.Y. B3 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N5 .....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes

Aliquippa, Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind Harbor,Ind. I-2, Y1.8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 .....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14 ..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange

Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ....6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel

Alabama City,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ....5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B2 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.

Claymont,Del. P4 .....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron

Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.

Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1 .7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,Ohio R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy

Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2..7.50
Youngstown Y1 .....7.50

PLATES, Ingot Iron

Ashland c.l. (15) A10 ..5.55
Ashland l.c.l. (15) A10..6.05
Cleveland c.l. R22 .....6.05
Warren,O. R2 .....6.05

FLOOR PLATES

Cleveland J5 .....6.375
Claymont,Del. P4 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind. Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ...5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 .....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
N.Tonawanda S47 .....5.675
Owensboro,Ky.(9) G8 ...6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 ....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9)N15 ..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 ..6.375
Warren,O. C17 .....6.025
Youngstown(9) R2, U5..5.675

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
N.Tonawanda S47 .....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14.6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H. R. High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 .....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2...5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12...5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron

Economy,Pa. B14.....16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon

LosAngeles P2, S30...11.75*

Alloy

Ambridge,Pa. W18....10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 .....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 .....8.10
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, H5, P17 ....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5....7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2...7.65
Hartford,Conn. R2.....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30.....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4...7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 .....7.90
Putnam,Conn. W18 .....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30.....9.10
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Ground)

Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 .....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2.....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.025
Detroit B5, P17 .....9.225
Detroit H5, S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025

Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ....9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 ..... 9.20
N.Tonawanda S47 ....9.025
Plymouth,Mich. P5 ....9.225
S.Chicago, Ill. W14 ....9.025
SpringCity,Pa. K3 .... 9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

Atlanta A11 ..... 5.00
Birmingham C15 ..... 5.25
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fontana,Calif. K1 ....6.375
Ind.Harbor,Ind. Y1 ....5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.475
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. W14 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Williamsport,Pa. S19 ...5.75

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2....7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
Seattle A24, B3, N14 ..7.95
Williamsport,Pa. S19 ..7.00
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 16.10
Economy,Pa.(D.R.)B14 20.50
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 20.50
McK.Rks.(S.R.) L5 ...16.10
McK.Rks.(D.R.) L5 ...20.50
McK.Rks.(Dir.Rolled)L513.55

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4) (44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 .....5.575
Tonawanda(3) B12 .....5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 .....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa.S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 .....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ...7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10.... 5.35
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 ..... 7.05
Middletown,O. A10 ....6.775
Warren,O. R2 ..... 7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana, Calif. K1 .... 7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ...9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.125	7.375
Canton,O. R2	7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	7.125	7.375
GraniteCity,Ill.G4	7.225	....
Ind.Harbor I-2	7.125	7.375
Irvin,Pa. U5	7.125	7.375
Kokomo,Ind. C16	7.225	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif. C11	7.875	....
Pittsburgh J5	7.125	....
SparrowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.375

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10..7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10(type 1) 9.525
Butler,Pa. A10(type 2) 9.625
Irvin,Pa. U5 (type 1)..9.525

SHEETS, Well Casing

Fontana,Calif. K1 .....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 .....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 .....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.H'rb'r,Ind. I-2, Y1 6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ....6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Branford Machine & Mfg.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire Div., Hoover Ball & Bearing
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
J10 Jay Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman & Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N17 National Steel Corp.
N20 Neville Ferro Alloy Co.

O1 Ohio Ferro-Alloys Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P10 Precision Strip Mill Div., Solar Steel Corp.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P25 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S31 Sawhill Tubular Products
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
S47 Seaway Steel Div., Roblin-Seaway Industries
T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Div., National Steel Corp.
W8 Western Cold Drawn Steel Div., Standard Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	5.10
Allenport,Pa. P7	5.10
Alton,Ill. L7	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala. T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackaw'na,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	5.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
SanFrancisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago,Ill. W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5, Y1	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor,Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield,Ala. T2	7.575
Farrell,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2, Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago,Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover,O. G6	7.425
Evanston,Ill. M22	7.425
Farrell,Pa. S3	7.425
Follansbee,W.Va. W10	7.425
Fontana,Calif. K1	9.20
FranklinPark,Ill. T6	7.425
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport,Pa. E10	7.525
NewBedford,Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, M23	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3, N8	7.975
Philadelphia P24	7.875
Riverdale,Ill. A1	7.425
RiverRouge,Mich. P16	7.425
Rome,N.Y.(32) R6	7.425
Sharon,Pa. S3	7.425
Trenton,N.J.(31) R5	8.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975
Youngstown S41, Y1	7.425

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie,Pa. S18	15.55
Cleveland A7	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
FranklinPark,Ill. T6	15.55
Harrison,N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. S8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind. Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80
Weirton,W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4 M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N2	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
RiverRouge,Mich. P10	9.05	10.50	12.70	....	....
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)

	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7	4.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport,Pa. E10	7.50*
NewCastle,Pa. M23	7.425*
Riverdale,Ill. A1	7.425*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41	7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	8.175

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Basis Weight 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
GraniteCity,Ill. G4	....	....	....	6.65
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irwin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Electrolytic (100 lb basis wt) 0.25 lb Coating

Aliquippa,Pa. J5	$9.10
Fairfield,Ala. T2	9.10
Fairless,Pa. U5	9.10
Fontana,Calif. K1	9.75
Gary,Ind. U5	9.10
GraniteCity,Ill. G4	9.20
Ind.Harb.,Ind. I-2, Y1	9.10
Irvin,Pa. U5	9.10
Niles,O. R2	9.10
Pittsburg,Calif. C11	9.75
SparrowsPt.,Md. B2	9.10
Weirton,W.Va. W6	9.10
Yorkville,O. W10	9.10

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.20
Fairless,Pa. U5	8.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

ELECTRO. TIN-COATED SHEET (20-27 gage; per 100 lb)

IndianaHarb.,Ind. Y1	$7.90

(21-27 gage; per 100 lb)

Aliquippa,Pa. J5	$7.90
Niles,O. R2	7.90

TIN PLATE, HOT DIPPED COMMON COKE 1.25 lb 1.50 lb

Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

HOLLOWARE ENAMELING (Black plate) (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65
					Stator
Mansfield,O. E6					8.10
Vandergrift,Pa. U5					8.10
Warren,O. R2 (Locore)					8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill. L1	8.20
Atlanta A1	8.00
Bartonville,Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet,Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
N.Tonawanda S47	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
S.Chicago,Ill. R2	8.00
S.SanFrancisco C10	8.95
SparrowsPoint,Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers,O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00
Buffalo S47	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa.(10) B2	12.65
KansasCity,Mo. U3	12.90
LosAngeles(2) B3	13.60
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	13.60
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	13.70
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md.(10)B2	12.75
Struthers,O. Y1	13.40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
Kokomo,Ind. C16	9.85
LosAngeles B3	10.70
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.075
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.075
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7	10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Bartonville,Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Fostoria,O. S1	9.80
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
LosAngeles B3	10.20
Milbury,Mass.(12) N6	10.05
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
Muncie,Ind. I-7	9.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.20
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.20
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Wor'ster,Mass.A7,J4,T6	10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville,Fla. M8	16.65
Johnstown,Pa. B2	16.30
KansasCity,Mo. S5	16.55
Kokomo,Ind. C16	16.30
Minnequa,Colo. C16	16.55
Monessen,Pa. P16	16.30
Muncie,Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan,Ill. A7	16.30
Worcester,Mass. A7,J6	16.60

ROPE WIRE (A)

Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S41	13.45
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

New Roebling Wide Width Tempered Spring Steel makes the most of a good thing

. . . (your money, for instance!)

You count your profits in the number of holes in your scrap. And spring steel that doesn't measure up to the most good parts per inch just isn't the right steel for you.

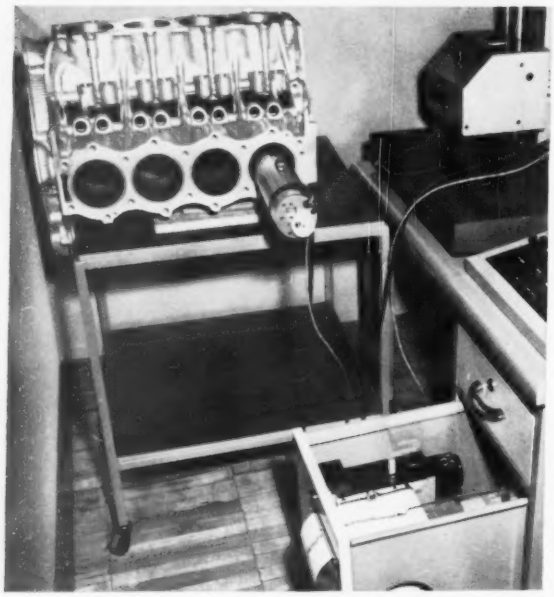
That's why everybody's talking about new Roebling tempered, cold rolled spring steel. Comes in *any* width up to a full handspan wide. 8⅜ inches, that is, by .005 to .062 inches thick. Think how useful that unique extra width can be in getting extra blanks from a length of steel! The thickness is consistent, too.

Now pick a finish — any finish — blued, straw, or bright — plain or ground, Roebling's got it. Buy Roebling Cold Rolled Spring Steel and you get uniform excellence in temper and finish. Delivery? No problem at all. Get full facts and figures by writing Roebling's Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

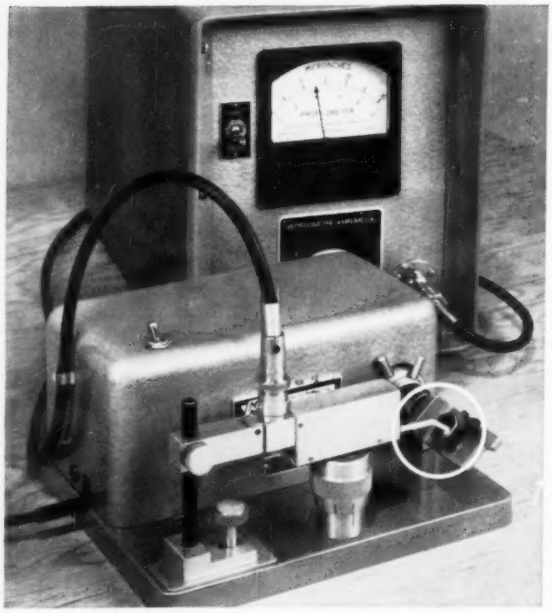
BREAKING MEASUREMENT BARRIERS WITH MICROMETRICAL



SHOWS CYLINDER WEAR: HOW MUCH and WHERE

PROBLEM: To determine (1) the surface texture obtained inside cylinder bores from various production processes, and (2) the amount and location of cylinder wear after trial runs. SOLUTION: Obtain magnified profiles of the surface—tracing lengthwise with a Proficorder® Internal Linear Pilotor inside the cylinders as shown at left. The pen-drawn profiles show the height and width of waves, steps, flaws, wear and roughness irregularities.

For more about the Proficorder, ask for BULLETIN LT24.



ROCKABYE RIG REPORTS ROUGHNESS

Production-checking the roughness of a recessed concave spherical surface is a cinch with the Profilometer® equipment at right. The Pilotor "rocks" the work-piece in an arc to move the surface back and forth beneath the Tracer point, while the meter shows the roughness in microinches. BULLETIN LT126 gives details.

There's Profilometer equipment for measuring the roughness of practically ALL machined and finished surfaces—quickly, dependably, in the shop. For features and applications ask for BULLETIN LT14.

MEASURES BALL BEARING NOISEPOWER

A company making electric motors found that ball bearings were a frequent cause of noise and vibration; and testing bearings by sound or touch failed to weed out the noise-makers. They licked this problem with the Anderometer® (left)—measuring all ball bearings in receiving inspection for vibration characteristics, and using only those whose Anderon ratings assure smooth, silent running.

BULLETIN LT11 describes the Anderometer. May we send you a copy?

MICROMETRICAL MANUFACTURING COMPANY
A SUBSIDIARY OF THE BENDIX CORPORATION
3621 S. STATE RD. ANN ARBOR 13, MICHIGAN

Manufacturer of the PROFILOMETER® • PROFICORDER® • MICROCORDER®
WAVOMETER® • ANDEROMETER® • VAROMETER®

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill. (7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N16	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb net box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	9.02
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	9.02
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.20
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.20
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	9.30
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	9.30
Kokomo,Ind. C16	9.16
LosAngeles B3	9.50
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.50
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	9.50
SparowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	9.35
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	9.35
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.55
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	9.55
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill. (7) N15	214

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	198
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	
Cleveland A7	17.85	
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass. W12	19.10	19.70†
Pitts.Calif. C11	18.20	19.75†
S.SanFran.C10	18.20	19.75**
SparrowsPt.	B2.17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½Ga. J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	192
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
S.Chicago,Ill. R2	187**
Sterling,Ill. (7) N15	192

WIRE, Merchant Quality

	6 to 8 gage	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**	
Aliquippa J5	8.65	9.325§	
Atlanta(48) A11	9.00	9.75*	
Bartonville(48) K4	9.10	9.80	
Buffalo W12	9.00	9.55†	
Chicago W13	9.00	9.55**	
Cleveland A7	9.00		
CrawfordsvilleM8	9.10	9.80††	
Donora,Pa. A7	9.00	9.55†	
Duluth A7	9.00	9.55†	
Fairfield T2	9.00	9.55	
Houston(48) S5	9.25	9.80**	
Jack'vill.,Fla. M8	9.10	9.80‡‡	
Johnstown(48) B2	9.00	9.675§	
Joliet,Ill. A7	9.00	9.55†	
KansasCity(48)S5	9.25	9.80**	
Kokomo(48) S16	9.10	9.65†	
LosAngeles B3	9.95	10.625§	
Minnequa C10	9.25	9.80**	
Monessen(48) P7	8.65	9.35§	
Palmer,Mass. W12	9.30	9.85†	
Pitts.,Calif. C11	9.95	10.50†	
S.SanFran. C10	9.95	10.50**	
S.Chicago R2	9.00	9.55**	
Spar'wsPt.(48)B2	9.10	9.775§	
St'ling(37)(48)N15	9.10	9.80	
Struthers,O. Y1	9.00	9.65‡	
Worcester,Mass.A7	9.30	9.85†	

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

FASTENERS

SCREWS, NUTS, BOLTS

(Consumer discounts per cent off list prices, plain finishes. For less than full container quantities, add 25 per cent; attaching nuts to bolts in sizes ¼ in. through ⅝ in. diameter through 8 in. in length, price on application. Discounts are determined by the quantity of screws, nuts, and bolts ordered for one destination at one time.)

Base, one keg	43.00
20,000 lb or more	53.00

SCREWS, SETSCREWS

Hex Screws and High Strength Hex Screws, through 1 in. x 12 in.:

Base, one keg	43.00
20,000 lb or more	53.00

Hex Screws 1⅛ in. diameter and larger: See net price schedule.

Fillister Head Screws, coarse thread:

Packages	+70.00
Bulk	+28.00

Flat Head Screws, coarse thread:

Packages	+100.00
Bulk	+52.00

Setscrews, Square Head Cup-point, coarse thread:

Packages	+10.00
Bulk	15.00

(Bulk discounts on fillister, flat head, and setscrews apply only to products ordered in these minimum quantities: ¼ in. through ⅝ in. diameter, 15,000 pieces; ⅞ in. through ⅝ in. diameter, 5000 pieces; and ¾ in. through 1 in. diameter, 2000 pieces.)

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in. larger 12.85 7/16 in. and smaller by 6 in. and shorter, 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Standard All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.725
Steelton,Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanan,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3⅛ in. and smaller rounds and 2½ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.25	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	41.50	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	50.00	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; Branford Machine & Mfg. Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Elwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Phoenix Steel Corp.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloy Steel Co., Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: Carbon Base 5%	10%	15%	20%	Sheets: Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Claymont, Del. P4; Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
NorthTonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	78.11	78.61	79.11	....
Rochester, N.Y., deld.	69.87	70.37	70.87	....
Syracuse, N.Y., deld.	71.22	71.72	72.22	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
SouthChicago, Ill. R2	66.00	66.50	66.50	67.00
SouthChicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland A7, R2	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Other U. S. Districts				
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
PortColborne, Ont. A25	65.00	65.00	65.50	66.00
SaultSte. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.60%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49% $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.45% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Chicago I-3 (Phos. 0.075% max)	71.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Phos. 0.075% max)	71.00
Erie, Pa. I-3 (Phos. 0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS				PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	STRUCTURAL SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	8.25	10.26	10.06	8.85	9.05	11.70	16.38	8.85	8.70	10.55
Birmingham	8.46	10.20	10.59	9.45	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.13	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.18	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.31	9.68
Detroit	9.48	10.46	10.50	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8 67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	8.00	9.28
Indianapolis	9.66	10.64	10.57	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.27	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9 57	10.55	10.48	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.35	11.37	10.05	13.25	16.40	10.35	9.04	11.82
New York	9.81	10.34	11.35	11.37	10.05	13.25	16.40	10.35	9.04	11.82
Philadelphia	9.50	10.00	10.66	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	9 22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10 40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	10.51	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	8.82	9.49	10.64	10.99	8.82	11.49	16.54	9.17	8.66	10.95
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.05	17.70	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $175.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, $163; E. Chicago, Ind., Joliet, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W. Va., Freeport, Vanport, Merrill Station, Clearfield, Pa., Wellsville, Irondale, New Salisbury, Ohio, $100; Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $250; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup, Tex., Fords, N. J., Philadelphia, $365.

Tar Bonded Brick (per ton)

Dolomite: Narlo, Ohio, $87.50. Dolomite-Magnesite: Hays, Pa., Hammond, Ind., $107; Narlo, Ohio, $109.50. Magnesite: Narlo, Ohio, $128; Hays, Pa., Hammond, Ind., $130.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ¾ in. grains bulk, Luning, Nev., $46; ¾ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Diam	Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents pel lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:

Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh bags	7.40††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, 1 in. x 1 in. x 1/4 in.	27.75
(In contract lots of 750 tons price is 22.75c)	
Annealed, 99.5% Fe, ton deld. east of Mississippi.	36.75,
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 41.30; ton lots	40.30
Brass, 80/20, leaded (60 mesh)	37.80
Bronze powder, 90-10.	56.80
Copper, all types	15.00*
Lead	7.50*
Manganese, 500 lb and up	25.00*
Nickel, all types	0.78-1.06
Nickel-Silver	56.00
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4600	32.00
Tin	14.00*
Zinc	23.20
Cobalt: 98.5%, minus 100-300 mesh	Dollars 1.57-1.58
99.5% below 5 microns	2.32
Molybdenu	3.50-4.10

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. (Source of shipment: Western Continental Europe.)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.05	$5.10	$5.00	$4.90	$5.20
Bar Size Angles	5.15	....	5.10	5.00	5.30
Structural Angles	5.15	5.20	5.10	5.00	5.30
I-Beams	5.15	5.20	5.10	5.00	5.30
Channels	5.20	5.25	5.15	5.05	5.35
Plates (basic bessemer)	5.20	5.25	5.10	5.10	5.45
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	24.16	....	24.09	23.81	25.54
Barbed Wire (†)	6.25	6.30	6.20	6.10	6.40
Merchant Bars	5.20	5.25	5.15	5.05	5.35
Hot-Rolled Bands	5.65	5.70	5.60	5.50	5.80
Wire Rods, Thomas No. 5 (Niederrhein)	5.40*	5.50	5.35	5.35	5.60
Wire Rods, O.H., No. 5 (Niederrhein)	5.70*	5.80	5.65	5.65	5.90
Bright Common Wire Nails (§)	7.05	7.10	7.00	6.90	7.20
(Source of Shipment: Japan)					
Wire, galvanized	8.60	....	8.60	8.60	8.55
Wire, bright	7.60	....	7.60	7.60	7.55
Wire Rods, O.H. No. 5 (Sumitomo)	5.60	....	5.60	5.50	....
Strand, stress relieved (Sumitomo)					
3/8 in. diam, 100 lineal ft	39.90	41.00	39.90	39.90	39.50
7/16 in. diam, 1000 lineal ft	53.50	54.70	53.50	53.50	53.00
Bright common wire nails	7.00	7.30	7.00	7.00	7.00

†Per 82 lb net reel. §Per 100 lb keg, 20d and heavier. *Except Boston.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

	Cents per unit
Swedish basic, 65%, c.l.f. Atlantic ports	25.00†
Chilean, 62-65%, c.l.f. Atlantic ports	22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

	Net ton, unit
Foreign wolframite, good commercial quality	$14.75-15.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 82.00-85.00c nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian	
48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†
South African Transvaal	
44% no ratio	18.75
48% no ratio	24.00-26.00†
Turkish	
48% 3:1	35.00-37.00†
Domestic Rail nearest seller	
18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

60% min	$4.15-4.40
65% min	4.50-4.75

Vanadium Ore

	Cents per lb V_2O_5
Domestic	31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

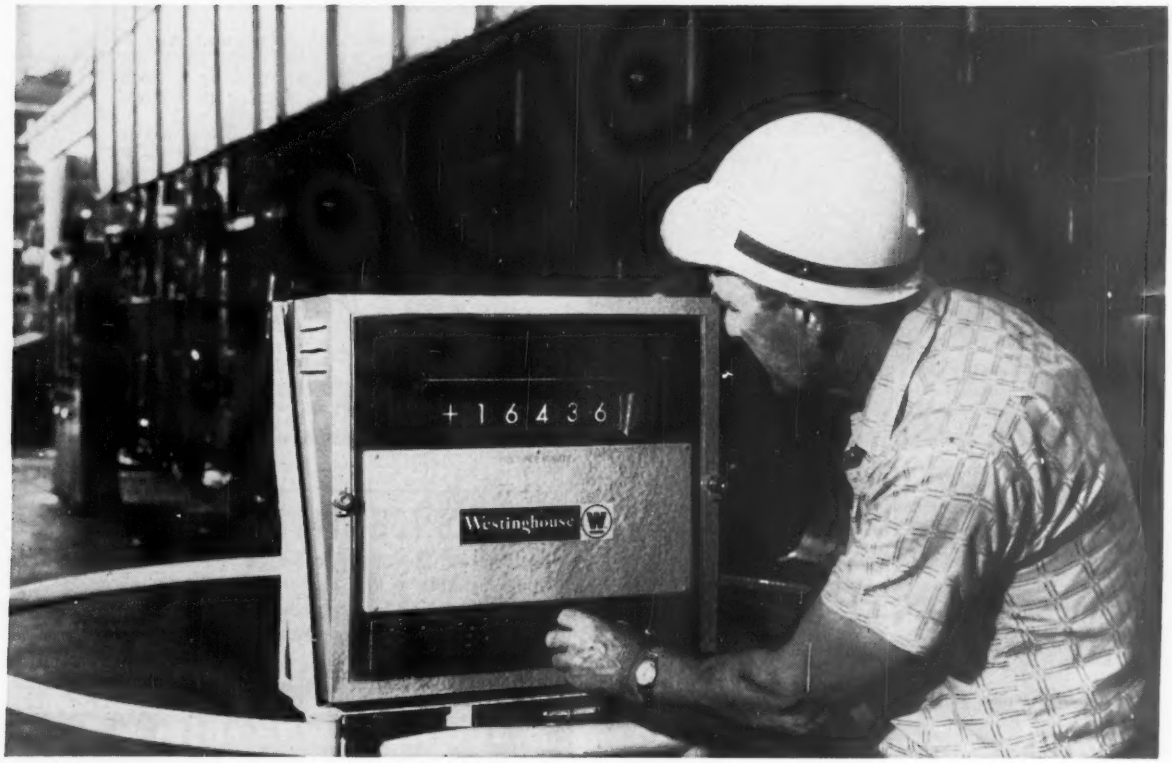
Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

New Westinghouse digital draw-speed indicator instantly reports precise strip process speeds and speed differentials



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This versatile product continually monitors speeds and draws, allowing fast location and trouble shooting of the causes of machine variations. In addition, it isolates the source of trouble to either regulator or mechanical problems.

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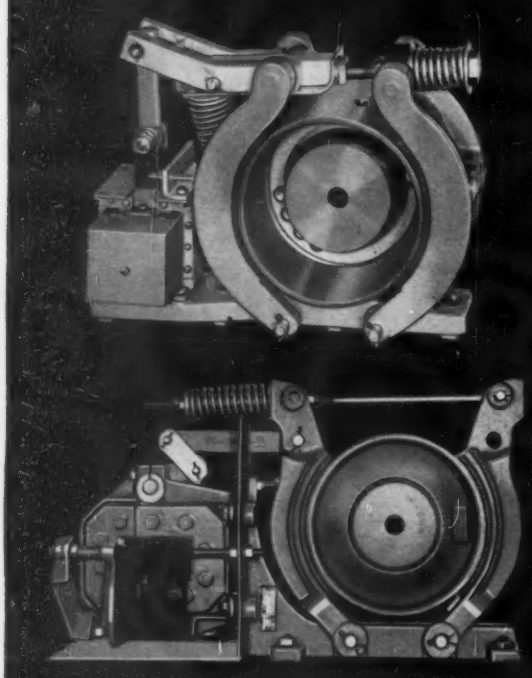

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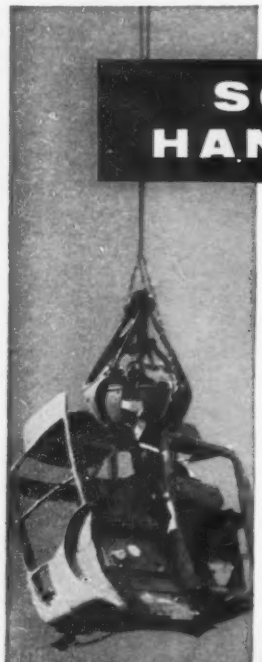

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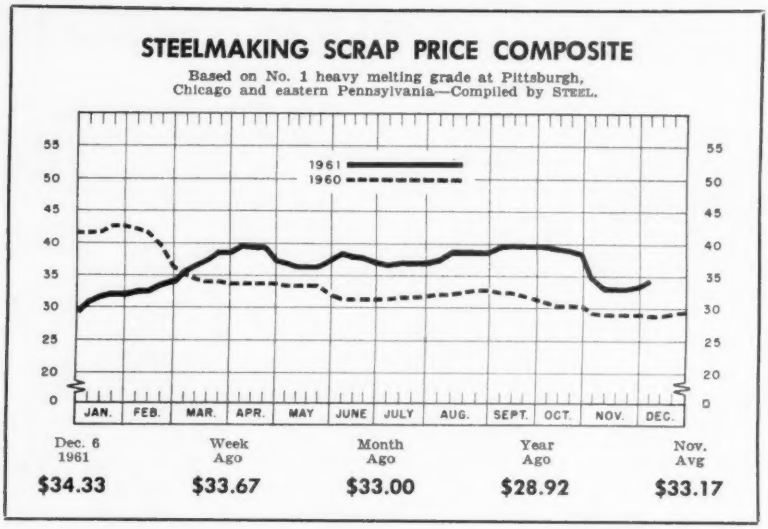

Scrap Price Advance Extended

STEEL's composite on No. 1 heavy melting steel advances another 66 cents a ton to $34.33. Consumer buying lags, but early resumption of volume demand is anticipated

Scrap Prices, Page 152

● **Pittsburgh**—The market is firmer because most sellers expect an uptrend in district steelmaking. No. 1 heavy melting scrap is up $1 on a broker's purchase for a mill on the fringe of the district. The broker's buying price ($36 a ton, delivered) is up $2 from the price offered dealers a month ago. Other dealer grades are up proportionately, but the cast iron grades are weaker.

● **Chicago**—Prices are up $1 to $2 a ton across the board as an aftermath of the late November bids on more than 26,000 tons of No. 1 factory bundles which district auto stamping plants will produce this month. A few leading steelmaking grades advanced $1 immediately after the initial news on bids, then rose another $1 when details were fully revealed. The remainder of the market has since taken the $2 markup.

There are no confirmed mill purchases of scrap at the higher levels, but justification for the stronger tone was provided when a leading mill announced $35 as the price it would pay this month for the No. 1 industrial heavy melting it accepts as returns from customers. Further strength results from the rise in steelmaking to the highest point since April, 1960.

● **Philadelphia** — Prices are fairly firm, except for some borings and turnings. Quotations on those grades are largely nominal. Domestic demand continues easy, but collections are slow. Further, while export volume is not as heavy as it was a month or two ago, a fair amount of tonnage is still being exported.

● **New York**—Brokers have reduced their buying prices on No. 1 cupola cast to $32-$33 and on heavy breakable cast to $31-$32. Prices on all the other grades are unchanged, with brokers anticipating a fairly steady market over the rest of this year.

● **Cleveland**—One Valley steelmaker paid $36 for a small tonnage of No.1 heavy melting, and another mill in the area is about to place a tonnage at a slightly higher level. Some material is being shipped from the Valley to a Cleveland automotive foundry at $37.50, delivered. Allowing for freight, that nets Valley shippers around $33. Some dealers are moving a little No.2 material.

● **Buffalo**—Limited orders for turnings are the only new mill pur-

(*Please turn to Page* 157)

Iron Ore Statistics—October, 1961

Iron Ore Inventory—October, 1961
(All sources; gross tons)

Inventory	U. S. Ores L. Sup.	U. S. Ores Other	Canadian Ores L. Sup.	Canadian Ores Other	Foreign Ores	Total
At U. S. Furnaces						
Start of Month	39,954,748	3,189,480	2,182,491	4,386,624	15,498,090	65,211,433
End of Month in:						
Mass., N. Y.	3,531,272	18,337	254,962	152,797	181,497	4,138,865
Pennsylvania	7,479,842	366,454	26,874	424,746	7,524,867	15,822,783
Md., Va., W. Va.	894,012	11,874	.....	2,044,202	2,201,268	5,151,356
Ky., Tenn., Tex.	313,604	195,270	.....	493,872	62,643	1,065,389
Alabama	871	1,586,899	.....	79,685	3,319,899	4,987,354
Ohio	10,527,051	21,101	975,764	1,492,481	1,362,943	14,379,340
Indiana	9,802,856	28,579	548,131	11,044	61,665	10,452,275
Illinois	5,555,728	37,117	82,372	.....	188,901	5,864,118
Mich., Minn.	4,064,375	.....	317,577	78,068	297,835	4,757,855
Colo., Utah, Calif.	.....	896,896	.....	.....	9,491	906,387
Undistributed	1,743	1,923	.....	.....	288	3,954
Total	42,171,354	3,164,450	2,205,680	4,776,895	15,211,297	67,529,676
At U. S. Docks	3,082,824	.....	215,327	924,566	1,862,129	6,084,846
Total U. S. Stocks	45,254,178	3,164,450	2,421,007	5,701,461	17,073,426	73,614,522
At Canadian Furnaces	3,000,854	.....	305,719	474,161	123,372	3,904,106
Total U. S.-Canada	48,255,032	3,164,450	2,726,726	6,175,622	17,196,798	77,518,628

Iron Ore Consumption—October, 1961
(All sources; gross tons)

Consumption	U. S. Ores L. Sup.	U. S. Ores Other	Canadian Ores L. Sup.	Canadian Ores Other	Foreign Ores	Total
In U. S.						
Mass., N. Y.	456,187	4,364	58,168	19,826	47,751	586,296
Pennsylvania	964,215	285,377	17,980	165,302	868,137	2,301,011
Md., Va., W. Va.	165,504	27,211	.....	376,335	414,779	983,829
Ky., Tenn., Tex.	106,424	72,012	.....	33,336	40,723	252,495
Alabama	.....	441,716	.....	7,301	171,708	620,725
Ohio	1,259,058	22,648	88,873	125,448	167,533	1,663,560
Indiana	1,090,946	.....	140,460	.....	38,173	1,269,579
Illinois	682,699	31,834	14,694	.....	33,415	733,254
Mich., Minn.	557,668	.....	61,874	20,522	24,316	664,380
Colo., Utah, Calif.	.....	604,968	.....	.....	.....	604,968
Undistributed	109	263	.....	.....	203	575
Total U. S.	5,282,810	1,490,393	352,661	748,070	1,806,738	9,680,672
Total Canada	381,911	.....	166,204	94,372	7,555	650,042
Total U. S.-Canada	5,664,721	1,490,393	518,865	842,442	1,814,293	10,330,714

Data from the American Iron Ore Association.

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Dec. 6, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Dec. 6	$34.33
Nov. 28	33.67
Nov. Avg.	33.17
Dec. 1960	28.92
Dec. 1956	64.29

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*35.00-36.00*
No. 2 heavy melting	*25.00-26.00*
No. 1 dealer bundles	*36.00-37.00*
No. 2 bundles	24.00-25.00
No. 1 busheling	*35.00-36.00*
No. 1 factory bundles	*41.00-42.00*
Machine shop turnings	13.00-14.00
Mixed borings, turnings	13.00-14.00
Shovel turnings	18.00-19.00
Cast iron borings	17.00-18.00
Cut structurals:	
2 ft and under	39.00-40.00
3 ft and under	36.00-37.00
Heavy turnings	31.00-32.00
Punchings & plate scrap	41.00-42.00
Electric furnace bundles	*42.00-43.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	*30.00-31.00*
Stove plate	*30.00-31.00*
Unstripped motor blocks	*22.00-23.00*
Clean auto cast	*32.00-33.00*
Drop broken machinery	44.00-45.00§

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Random rails	45.00-46.00
Angles, splice bars	43.00-44.00
Railroad specialties	44.00-45.00
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles & solids	190.00-195.00
18-8 turnings	115.00-120.00
430 bundles & solids	90.00-95.00
410 turnings	55.00-60.00

CHICAGO

No. 1 hvy melt., indus.	*34.00-35.00*
No. 1 hvy melt., dealer	*32.00-33.00*
No. 2 hvy melting	*29.00-30.00*
No. 1 factory bundles	*37.00-38.00*
No. 1 dealer bundles	*33.00-34.00*
No. 2 bundles	*24.00-25.00*
No. 1 busheling, indus.	*34.00-35.00*
No. 1 busheling, dealer	*32.00-33.00*
Machine shop turnings	*17.00-18.00*
Mixed borings, turnings	*19.00-20.00*
Shovel turnings	*19.00-20.00*
Cast iron borings	*19.00-20.00*
Cut structurals, 3 ft	*40.00-41.00*
Punchings & plate scrap	*42.00-43.00*

Cast Iron Grades

No. 1 cupola	*41.00-42.00*
Stove plate	*35.00-36.00*
Unstripped motor blocks	*33.00-34.00*
Clean auto cast	*46.00-47.00*
Drop broken machinery	*46.00-47.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*36.00-37.00*
R.R. malleable	*46.00-47.00*
Rails, 2 ft and under	*50.00-51.00*
Rails, 18 in. and under	*52.00-53.00*
Angles, splice bars	*44.00-45.00*
Axles	*53.00-54.00*
Rails, rerolling	*58.00-59.00*

Stainless Steel Scrap

18-8 bundles, solids	*170.00-175.00*
18-8 turnings	*100.00-105.00*
430 bundles & solids	80.00-85.00
430 turnings	45.00-50.00

BUFFALO

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	24.00-25.00
No. 1 bundles	27.00-28.00
No. 2 bundles	23.00-24.00
No. 1 busheling	27.00-28.00
Shovel turnings	17.00-18.00
Machine shop turnings	12.00-13.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	36.00-37.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cuopla	37.00-38.00
No. 1 machinery	44.00-45.00

Railroad Scrap

Rails, random lengths	38.00-39.00
Rails, 3 ft and under	44.00-45.00
Railroad specialties	37.00-38.00
Rails, rerolling	60.00-61.00

CLEVELAND

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	*23.00-24.00*
No. 1 factory bundles	37.00-38.00
No. 1 bundles	*34.00-35.00*
No. 2 bundles	*22.00-23.00*
No. 1 busheling	*34.00-35.00*
Machine shop turnings	15.00-16.00
Shovel turnings	19.00-20.00
Mixed borings, turnings	19.00-20.00
Cast iron borings	19.00-20.00
Cut foundry steel	*34.50-35.50*
Cut structurals, plate 2 ft and under	*39.00-40.00*
Low phos. punchings & plate	*35.00-36.00*
Alloy free, short shovel turnings	20.00-21.00
Electric furnace bundles	*35.00-36.00*

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	26.00-27.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	27.00-28.00
Brake shoes	37.00-38.00
Clean auto cast	39.00-40.00
Burnt cast	30.00-31.00
Drop broken machinery	45.00-46.00

Railroad Scrap

R.R. malleable	48.00-49.00
Rails, 2 ft and under	*48.00-49.00*
Rails, random lengths	*45.00-46.00*
Rails, 18 in. and under	*50.00-51.00*
Cast steel	*40.00-41.00*
No. 1 railroad cast	*45.00-46.00*
Railroad specialties	*46.00-47.00*
Angles, splice bars	*43.00-44.00*
Rails, rerolling	50.00-51.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	155.00-160.00
18-8 turnings	85.00-90.00
430 clips, bundles, solids	80.00-85.00
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	*36.00-37.00*
No. 2 heavy melting	*26.00-27.00*
No. 1 busheling	*37.00-38.00*
No. 1 bundles	*37.00-38.00*
No. 2 bundles	*24.00-25.00*
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	*38.00-39.00*
Electric furnace bundles	*38.00-39.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*38.00-39.00*

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*32.50-33.50*
No. 2 heavy melting	25.00-26.00
No. 1 bundles	*33.50-34.50*
No. 2 bundles	18.00-19.00
No. 1 busheling	*32.50-33.50*
Machine shop turnings	8.00-9.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Low phos., 18 in.	40.00-41.00

Cast Iron Grades

No. 1 cupola	33.00-34.00
Heavy breakable cast	29.00-30.00
Charging box cast	32.00-33.00
Drop broken machinery	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 18 in. and under	47.00-48.00
Rails, random lengths	41.00-42.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	20.00-21.00
No. 1 bundles	30.00-31.00
No. 2 bundles	21.00-22.00
No. 1 busheling	27.00-28.00
Machine shop turnings	8.00-9.00
Mixed borings, turnings	9.00-10.00
Shovel turnings	11.00-12.00

Cast Iron Grades

No. 1 cupola	30.00-31.00
Mixed cast	*29.00-30.00*
Heavy breakable	*25.00-26.00*
Unstripped motor blocks	*21.00-22.00*
Clean auto cast	37.00-38.00

Stainless Steel Scrap

18-8 bundles & solids	165.00-170.00
18-8 turnings	70.00-75.00
430 bundles & solids	65.00-70.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	28.00
No. 1 bundles	36.00
No. 2 bundles	23.00
No. 1 busheling	36.00
Electric furnace bundles	37.00
Mixed borings, turnings	15.00†
Shovel turnings	20.00
Machine shop turnings	13.00†
Heavy turnings	24.00†
Structurals & plates	38.00-40.00
Couplers, spring, wheels	40.00
Rail crops, 2 ft & under	48.00-49.00

Cast Iron Grades

No. 1 cupola	*38.00*
Heavy breakable cast	39.00
Drop broken machinery	48.00
Malleable	48.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	27.00-28.00
No. 2 bundles	18.00-19.00
Machine shop turnings	4.50-5.00†
Mixed borings, turnings	5.00-5.50†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	34.00-35.00

Cast Iron Grades

No. 1 cupola	*32.00-33.00*
Unstripped motor blocks	23.00-24.00
Heavy breakable	*31.00-32.00*

Stainless Steel

18-8 sheets, clips, solids	145.00-150.00
18-8 borings, turnings	70.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	31.00
No. 2 heavy melting	*27.00*
No. 1 bundles	32.00
No. 2 bundles	21.00
No. 1 busheling	32.00
Machine shop turnings	13.50
Shovel turnings	15.50

Cast Iron Grades

No. 1 cupola	34.00
Charging box cast	33.00
Heavy breakable cast	*31.00*
Unstripped motor blocks	33.00
Clean auto cast	37.00
Stove plate	*31.00*

Railroad Scrap

No. 1 R.R. heavy melt.	34.00
Rails, random lengths	38.00
Rails, rerolling	*52.00*
Rails, 18 in. and under	43.00
Railroad specialties	38.00
Angles, splice bars	38.00

BIRMINGHAM

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
No. 1 busheling	36.00-37.00
Cast iron borings	9.00-10.00
Machine shop turnings	16.00-17.00
Shovel turnings	18.00-19.00
Bar crops and plate	41.00-42.00
Structurals & plate	40.00-41.00
Electric furnace bundles	36.00-37.00
Electric furnace:	
3 ft and under	34.00-35.00
2 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Stove plate	38.00-39.00
Unstripped motor blocks	29.00-30.00
No. 1 wheels	33.00-34.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
Rails, rerolling	46.00-47.00
Rails, 2 ft and under	44.00-45.00
Rails, random lengths	40.00-41.00
Angles, splice bars	42.00-43.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	*34.00-35.00*
No. 2 heavy melting	*31.00-32.00*
No. 1 bundles	*36.00-37.00*
No. 2 bundles	*23.00-24.00*
Machine shop turnings	12.50-13.00
Crushed turnings	18.00-19.00
Low phos. plate & structurals:	
3 ft	*39.00-40.00*
2 ft and under	*43.00-44.00*

Cast Iron Grades

No. 1 cupola	38.00-39.00
Heavy breakable	24.00-25.00
Foundry malleable	28.00-29.00
Unstripped motor blocks	29.00-30.00

Railroad Scrap

R.R. heavy melt (3 ft)	*36.00-37.00*

LOS ANGELES

No. 1 heavy melting	*30.00*
No. 2 heavy melting	*22.00*
No. 1 bundles	*23.00*
No. 2 bundles	*19.00†*
Machine shop turnings	*10.00*
Shovel turnings	*10.00*
Cast iron borings	*10.00*
Electric furnace scrap	*44.00*

Cast Iron Grades

No. 1 cupola	*45.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*38.00*

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	46.00
No. 2 heavy melting	41.00
No. 2 bundles	26.00
Shovel turnings	18.00
Electric furnace	49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable	35.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	33.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	46.00
No. 1 hvy (unprepared)	41.00
No. 2 heavy melting	41.00
No. 2 hvy (unprepared)	37.00
No. 2 bundles	26.00
Shovel turnings	16.00
Electric furnace	49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	35.00
Stove plate	33.00
Unstripped motor blocks	33.00

SAN FRANCISCO

No. 1 heavy melting	*35.00***
No. 2 heavy melting	*30.00***
No. 1 bundles	*25.00***
No. 2 bundles	*22.00***
Machine shop turnings	15.00
Mixed borings, turnings	15.00
Cast iron borings	15.00
Heavy turnings	15.00
Shovel turnings	15.00

Cast Iron Grades

No. 1 cupola	45.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

No. 1 heavy melting	27.00
No. 2 hvy melt, 2 ft & under	26.00
No. 1 bundles	28.00
No. 2 bundles	21.50
Mixed steel scrap	19.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	27.00
Unprepared	21.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

Another **NEW** airless spray gun from Binks

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❶ **NEW** removable metal screen cartridge keeps nozzles clear longer by trapping foreign particles before they reach and clog the nozzle.

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What Action on Silver Means

Nonferrous Metal Prices, Pages 156 & 157

PRESIDENT KENNEDY's decision to take the U. S. out of the silver market will have far ranging effects —and it may be months before the full impact is felt.

Here are some possibilities:

- Users will pay more for silver than they have in the past.
- Metal will be available to take care of industrial needs.
- A full scale battle over some of Mr. Kennedy's recommendations may be waged in Congress.

• Kickoff — Mr. Kennedy's action was triggered by the sharp decline in free stocks of Treasury silver. They have been falling steadily over the last few years; and the rate of withdrawal quickened this fall (see table) as users, fearing a complete workoff and resultant runaway price, rushed in to buy. At that point, Mr. Kennedy stopped the sale of Treasury free stocks.

The immediate effect was to push the price up 9.375 cents an ounce to $1.0075 an ounce. What happens next is anyone's guess. Many factors determine price, and silvermen are reluctant to speculate on where it will end up. But it is unlikely that the price will rise as high as $1.29 an ounce because silver certificates can be redeemed at that level.

More likely: A steady rise over the next year or so to somewhere between $1.10 and $1.20 an ounce.

• Background—The nub of the situation is that by law the Treasury Department is required to buy all silver tendered to it at a price of 90.5 cents an ounce. In 1946, however, Congress gave Treasury the right to sell silver from its free stocks at no less than 90.5 cents. (Seventy per cent of Treasury purchases are held to back up silver certificates; the remaining 30 per cent go into free stocks.)

The Key in Silver

Decline in Free Stocks Spurred Kennedy's Move

(Ounces)

January, 1960 . .	175 million
January, 1961 . .	123 million
August, 1961 . . .	78 million
December, 1961 .	22 million

Treasury has been selling silver for 91 cents an ounce (91.625 cents delivered). Since 1946, it has sold over 145 million ounces.

For some time, silver people have been arguing that Treasury should raise its price for two reasons: To forestall a sharp hike when free stocks become exhausted and to get more silver into the market. The problem is that Free World silver usage has outraced production in every year since World War II. Last year, Free World consumption reached 325 million ounces; production was only 210 million ounces; both statistics should be about the same this year.

• Mr. Kennedy's Plan—The President went several steps beyond what the producers, even users, had recommended. He requested that Congress repeal the Silver Purchase Act (which puts a floor under the price) and the 50 per cent federal transfer tax on silver (which has ruled out a futures market). He went even farther: He ordered Treasury to begin withdrawing $5 and $10 silver certificates and replacing them with Federal Reserve notes to meet the government's need of metal for coinage (about 500 million ounces of silver back up these certificates). Mr. Kennedy also intends to ask Congress for authority to begin replacing $1 and $2 silver certificates with Federal Reserve notes. (As of now, only silver certificates can be issued in those denominations.) Treasury holds 1.2 billion ounces of silver to back up those certificates.

There's sure to be Congressional opposition to Mr. Kennedy's proposal. In the meantime, users and producers will be keeping a sharp eye on whether the new policies will attract more silver to the market.

Zinc Price Hiked

The price of prime western zinc has been boosted 0.5 cent. The new price is 12 cents a pound (East St. Louis, Ill., basis). Behind the move: The continuation of hefty sales. Demand from galvanizers has been strong all year. Lately, sales of the diecasting grades to automakers have picked up sharply. Producer stocks have been tumbling because demand has outraced production over the last several months. Only sour note: The continuation of the discounting in zinc diecasting premiums.

NONFERROUS PRICE RECORD

	Dec. 6 Price	Last Change	Previous Price	Nov. Avg	Oct. Avg	Dec., 1960 Avg
Aluminum	24.00	Sept. 25, 1961	26.00	24.000	24.000	26.000
Copper	31.00	May 19, 1961	30.50	31.000	31.000	30.000
Lead	10.05	Nov. 28, 1961	9.80	10.007	10.800	11.185
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	81.25	June 30, 1961	74.00	81.250	81.250	74.000
Tin	122.00	Dec. 6, 1961	122.25	123.087	121.099	101.631
Zinc	12.00	Dec. 1, 1961	11.50	11.50	11.50	12.481

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, East St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingot, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig, 99.8%, Velasco, Tex.

Joint effort by the Department of the Navy Bureau of Ships and major bearing manufacturers has resulted in the development of super precision bearings identified as "Navy Quiet."

As a producer of superior quality bearings with smooth *Hoover Honed* raceways and accurate *Micro-Velvet* balls, it was natural for Hoover to find itself in a position of leadership in the "Navy Quiet" bearings project. Today, Hoover has perfected quiet bearings to such a high degree that Navy noise reduction goals are not only met, but surpassed!

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290 Lodi Street, Hackensack, New Jersey
2020 South Figueroa, Los Angeles 7, California

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 30 and 50 lb ingots, 24.00, 30,000 lb or more, f.o.b. customer custody.
Aluminum Alloy: No. 13, 25.20; No. 43, 25.30; No. 195, 26.70; No. 214, 28.10; No. 356, 26.00, 30 and 50 lb ingots.
Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.
Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.
Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.
Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.
Bismuth: $2.25 per lb, ton lots.
Cadmium: Sticks and bars, $1.70 per lb deld.
Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.
Columbium: Powder, $40 per lb and up nom.
Copper: Electrolytic, 31.00 deld; custom smelters, 31.00 nom; lake, 31.00 deld; fire refined, 30.75.
Germanium: Purified, ingots, less than 1 kg 37.50 per gram; 1-10 kg 32.00 per gram; 10 kg or more, 29.95 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.
Gold: U. S. Treasury, $35 per oz.
Indium: 99.9%, $2.25 per troy oz.
Iridium: $70-75 per troy oz nom.
Lead: Common, 10.05; chemical, 10.15; corroding, 10.15; St. Louis. New York basis, add 0.20.
Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld; 24-99 lb, $9.50; 100-449 lb, $9.25; 450 lb or more, $9 per lb, delivered.
Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.
Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.
Mercury: Open market, spot, New York, $188-191 per 76 lb flask.
Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $5 per lb, f.o.b. Coldwater, Mich.
Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 81.25; 10-lb pig, unpacked, 89.00; "XX" nickel shot, 88.75; "F" nickel shot for addition to cast iron, in kegs, 81.75; "F" nickel, 5 lb ingots, 82.75. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.09.
Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 77.50.
Osmium: $70-90 per troy oz nom.
Palladium: $24-26 per troy oz.
Platinum: $82-85 per troy oz from refineries.
Radium: $16-21.50 per mg radium content, depending on quantity.
Rhodium: $137-140 per troy oz.
Ruthenium: $55-60 per troy oz.
Selenium: $5.75 per lb, commercial grade.
Silver: Open market, 101.25 per troy oz.
Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.
Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.
Tellurium: $5.25 per lb, 100 lb or more.
Thallium: $7.50 per lb.
Tin: Straits, N. Y., spot and prompt, 122.00.
Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max), $1.37 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.
Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.25.
Zinc: Prime Western, 12.00; brass special 12.20; intermediate, 12.20, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.85; special high grade, 13.00 deld. Diecasting alloy ingot No. 3, 14.25; No. 2, 14.75; No. 5, 14.50 deld.
Zirconium: Reactor grade sponge, 100 lb or less, $7.25-7.75 per lb; 100-500 lb, $6.75-7.25 per lb; 500-1000 lb, $6.25-6.75; over 1000 lb, $6.25 per lb.
(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.00; No. 12 foundry alloy (No. 2 grade), 21.25; 5% silicon alloy, 0.60 Cu max, 23.00; 13 alloy, 0.60 Cu max, 23.00; 195 alloy, 24.25; 108 alloy, 21.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 22.75; grade 2, 21.50; grade 3, 20.50; grade 4, 19.50.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 406, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.98, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.98, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.96. Weatherproof 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $15.75 per cwt; pipe, full coils, $15.75 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $5.70-15.50; sheared mill plate, $4.45-9.00; wire, $5.00-9.50; forging billets, $3.00-4.75; hot-rolled and forged bars, $3.39-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $11.00-16.00; H.R. strip, $11.00-15.00; C.R. strip, $13.00-18.00; forged or H.R. bars, $11.00-15.00.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	147	126	145
Strip, C.R.	133	114	145
Plate, H.R.	134	116	133
Rod, Shapes, H.R. .	116	95	116
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.183	24-72	72-180	44.40-47.00
0.183-0.154	24-72	72-180	44.40-47.00
0.154-0.120	24-72	72-180	44.90-47.80
0.120-0.096	24-72	72-180	44.90-47.80
0.096-0.076	24-72	72-180	45.40-49.30
0.076-0.060	24-72	72-180	45.90-50.10
0.060-0.047	24-72	72-180	46.40-51.30
0.047-0.037	24-72	72-180	46.90-52.70
0.037-0.030	24-72	72-180	47.40-54.30
0.030-0.023	24-60	72-180	47.90-56.10
0.023-0.018	24-48	72-144	48.40-56.40
0.018-0.014	24-48	72-144	50.20-57.00
0.014-0.011	24-48	72-144	52.50-59.00
0.011-0.0085	24-36	72-96	55.20
0.0085-0.007	24-36	72-96	58.20
0.007-0.006	24-36	72-96	61.00

ALUMINUM (continued)

Plates: 1100, 3003, and 5005, mill finish, 0, H12, and H14 tempers, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
3.000-2.000	6-144	72-240	45.10-50.00
2.000-1.251	6-144	72-240	45.50-50.30
1.251-0.751	6-144	72-240	44.50-49.60
0.751-0.250	6-144	72-240	44.50-49.60

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam. (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	76.30	....	....
0.188	63.20	62.20	....	79.10
0.250	60.00	61.60	72.70	73.10
0.375	59.20	62.80	71.00	71.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	62.80	71.00	71.00
0.625	59.20	62.80	67.80	66.90
0.750	57.70	61.00	61.60	62.80
0.875	57.70	61.00	61.60	62.80
1.000	57.70	61.00	61.60	62.80
1.125	55.30	58.50	59.50	60.50
1.375	55.30	58.50	59.50	60.50
1.500	55.30	58.50	59.50	60.50
1.625	53.00	55.70	....	58.30
1.750	53.00	55.70	58.30	58.30
1.875	53.00	55.70	....	58.30
2.000	53.00	55.70	58.30	58.30
2.250	51.50	54.00	....	58.30
2.500	51.50	54.00	....	58.30
2.750	49.90	52.20	....	58.30
3.000	49.00	52.20	....	58.30
3.250	....	52.20	....	....
3.375	....	52.20	....	....

Selected sizes.

Forging Stock: Rounds, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 45.50-55.60; 6061, 41.50-55.60; 7075, 56.50-64.60; 7079, 58.50-66.60.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes, 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 103.80; .125 in. 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. width: .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-106.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.25-23.75; No. 2 heavy copper and wire, 21.50-22.00; light copper, 18.75-19.25; No. 1 composition red brass, 20.50-21.00; No. 1

BRASS MILL PRICES

MILL PRODUCTS a

(Copper or Copper Alloy No.)	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper (110)	56.13b	50.36-51.36	....	57.32
Yellow Brass (268, 270).	49.27	35.77c	49.56	53.43
Low Brass, 80% (240)..	52.15	52.09	52.44	56.21
Red Brass, 85% (230)...	53.17	53.11	53.46	57.23
Com. Bronze, 90% (220)	54.73	54.67	55.02	58.54
Manganese Bronze (675)	57.69	51.27	61.54	....
Muntz Metal (365)	51.94	47.25	....	....
Naval Brass (464)	53.94	47.75	60.25	58.10
Silicon Brass (651)	61.39	60.58	60.68	79.80
Nickel Silver, 10% (745)	65.56	67.16	66.91	....
Phos. Bronze, A-5% (510)	76.97	77.47	76.72	78.90

SCRAP ALLOWANCES d (Based on copper at 31.00c)

	Clean Heavy	Rod Ends	Clean Turnings
Copper (110)	27.00	27.00	26.25
Yellow Brass (268, 270).	20.375	19.50c	18.50c
Low Brass, 80% (240)..	22.875	22.625	22.125
Red Brass, 85% (230)...	23.875	23.625	23.125
Com. Bronze, 90% (220)	24.75	24.50	24.00
Manganese Bronze (675)	19.25	19.00	18.50
Muntz Metal (365)	19.125	18.875	18.375
Naval Brass (464)	19.00	18.75	18.25
Silicon Brass (651)	26.50	26.25	25.75
Nickel Silver, 10% (745)	26.00	25.75	13.00
Phos. Bronze, A-5% (510)	28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb. f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 19.50-20.00; new brass clippings, 15.00-15.50; light brass, 12.00-12.50; heavy yellow brass, 13.00-13.50; new brass rod ends, 14.00-14.50; auto radiators, unsweated, 16.50-17.00; cocks and faucets, 17.00-17.50; brass pipe, 15.00-15.50.

Lead: Soft scrap lead, 6.25-6.50; battery plates, 2.00-2.25; linotype and stereotype, 7.50-7.75; electrotype, 7.00-7.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 32.00; old sheets, 30.00; turnings, 22.00-24.00; rods, 32.00.

Nickel: Sheets and clips, 56.00-58.00; rolled anodes, 60.00-62.00; turnings, 43.00; rod ends, 56.00-58.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.25; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 8.00-8.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 10.00-10.50; segregated high copper clips, 9.00-9.50; mixed low copper clips, 9.50-10.00; mixed high copper clips, 9.00-9.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 7.00-7.50; segregated low copper clips, 14.00-14.50; segregated high copper clips, 12.50-13.50; mixed low copper clips, 12.00-13.00; mixed high copper clips, 11.00-12.00.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 9.75; clean borings and turnings, 8.50; segregated low copper clips, 13.00; segregated high copper clips, 12.25; mixed low copper clips, 12.50; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 24.75; light copper, 22.50; refinery brass (60% copper) dry copper content, 23.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 24.75; light copper, 22.50; No. 1 composition borings, 23.50; No. 1 composition solids, 24.00; heavy yellow brass solids, 16.50; yellow brass turnings, 15.50; radiators, 20.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 117.50; 500-1999 lb, 110.50; 2000-4999 lb, 107.00; 5000-29,999 lb, 106.00; 30,000 lb, 105.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 140.50; 200-499 lb, 139.00; 500-999 lb, 138.50; 1000 lb or more, 136.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.85, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chrome Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.5; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cynide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5900 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 47.50; 200 lb, 45.50; 300 lb, 44.50; 500-4900 lb, 42.50; 5000-9900 lb, 40.50; 10,000 lb or more, 39.50.

Nickel Sulphate: 5000-22,999 lb, 31.00; 23,000-39,900 lb, 30.50; 40,000 lb or more, 30.00.

Sodium Cyanide (Cyanebrik): 200 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 89.20; 100-600 lb, 79.50; 700-1900 lb, 76.80; 2000-9990 lb, 74.90; 10,000 lb or more, 73.60.

Stannous Chloride (Anhydrous): 100 lb, 148.40; 400 lb, 138.40; 800-19,000 lb, 117.10; 20,000 lb or more, 112.90.

Stannous Sulphate: Less than 50 lb, 155.70; 50 lb, 125.70; 100-1900 lb, 123.70; 2000 lb or more, 121.70.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 151)

chases made here so far for December delivery. Prevailing prices were paid. There is virtually no new business in No. 1 heavy melting and the market over-all appears to be leveling off around current price levels. Little new buying is anticipated before the turn of the year.

• **Detroit**—Great Lakes Steel Div., National Steel Corp., has orders out for bundles at $33, delivered. Ford has a mixed scrap order out. The market continues to move sidewise.

• **Cincinnati**—The No. 1 grades of heavy melting steel advanced $1 a ton (the quote, $32.50-$33.50) as a district mill re-entered the market for December shipment tonnage. It was its first general program in five months. Traders anticipate a further price advance next month.

• **St. Louis**— Prices are holding despite a slight improvement in demand. Traders anticipate a steady pickup over the winter months with prospects for rising steelmaking operations considered bright. Dealers are not pressing metal onto the market, and the mills are reportedly meeting some difficulty in getting all the tonnage they require at present price levels.

• **Birmingham** — Scrap is moving slowly in this market. Some dealers are reported to be shipping at a slower than normal pace in an effort to firm up the market.

• **Houston** — Prices continue to weaken. No significant buying is in sight before the end of the year. Over-the-scale intake has been far below normal in recent weeks, but still material is beginning to pile up. Brokers think it would take a combination of strong mill and export demand to revive the market.

• **Seattle**—The market appears to be weaker. Dealers are not quoting prices openly, so that published quotations are mostly nominal. Buyers, including exporters, are not adding to their inventories. Country collections have fallen off because of the slow demand.

Scrapmen are looking to Japan for signs of the market trend over the near future.

• **San Francisco**—Prices are off $3 a ton on No. 1 and No. 2 heavy melting steel. Dealers attribute the drop to lack of buying. Some other grades are quoted $1 and $2 a ton lower.

• **Los Angeles**—The market is "dead" and a further decline in prices is expected. While dealers' yard stocks are not abnormally high, they are too high in relation to current demand and are pressing on the market.

Prospects for Exports of Scrap to Japan Are Mixed

Short term prospects for scrap exports for 1962 do not match the showing in 1961, but the long term outlook, particularly on shipments to Japan, appear bright, Ralph Michaels, executive vice president, Hyman Michaels Co., Chicago, told a meeting of the Chicago Chapter

CLASSIFIED

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FOB WAREHOUSE DETROIT

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Strikes?—Unknown. Location?—Fort Madison, Iowa. Plant—33,000 feet—Modern one-floor — Sprinklers. Office? — Modern, air conditioned. PRICE? — COULDN'T BE MATCHED! FINDERS FEE PAID.

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209 So. La Salle St. Chicago 4, Ill.

Positions Wanted

ENGINEER, C. E., experienced in estimating, design, purchasing, sales, desires new connection in metal fabrication, metal products or construction fields. Will relocate, New England area preferred. Write Box 978, STEEL, Penton Bldg., Cleveland 13, Ohio.

Detail showing tong positioning hot stock between Impacter dies

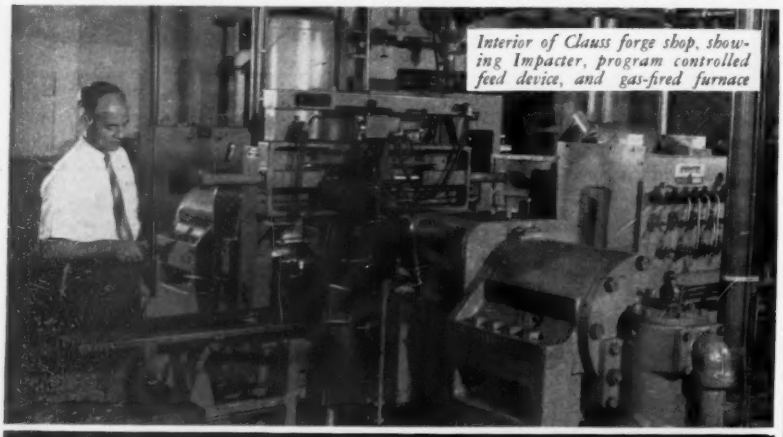
BETTER drop forgings FASTER

automatically...on the Impacter

Clauss Cutlery Company, Fremont, Ohio, is getting **better quality, increased production, reduced scrap,** and **savings in stock** required per forging, for their famous Clauss line of scissors, shears and snips. The Cecomatic Forging Process, incorporating the new **Model "C" Impacter,** is responsible for these and many other outstanding benefits. To learn how, write for a reprint of The Clauss Story and a copy of Bulletin 110-L-1.

CHAMBERSBURG ENGINEERING COMPANY • CHAMBERSBURG, PA.

THE FRANKLIN INSTITUTE'S 1961 LONGSTRETH MEDAL "FOR INVENTIONS OF HIGH ORDER" WAS AWARDED THE DESIGNERS OF THE IMPACTER



Interior of Clauss forge shop, showing Impacter, program controlled feed device, and gas-fired furnace

CHAMBERSBURG

of the Institute of Scrap Iron & Steel.

He said Japanese demand in 1962 would possibly be off 20 to 25 per cent from the 5 million tons taken in 1961. Currency problems and difficulties encountered in unloading vessels at Japanese ports were cited as hindrances to exports. However, he said he thought Japanese requirements of U. S. scrap would reach 7 to 7.5 million tons by 1970.

Pig Iron . . .

Pig Iron Prices, Page 147

Stronger demand for pig iron is expected in first quarter as consumers start stockpiling in anticipation of a possible midyear steel strike. Merchant iron producers will likely light additional stacks to take care of the increased demand.

Current buying is at a steady but restricted pace. A lag is expected however, due to yearend influences. Observance of the holidays will cut consumption.

Alan Wood Steel Co., Conshohocken, Pa., has withdrawn from the market on intermediate low phosphorous iron.

Iron Ore . . .

Iron Ore Prices, Page 148

Shipments of Lake Superior iron ore in November totaled 5,844,849 gross tons, up 3,901,869 tons from the 1,942,980 tons moved in November, 1960, reports the American Iron Ore Association. Cumulative shipments in the 1961 navigation season to Dec. 1 were 57,300,197 tons, off 12,331,592 from the 69,631,789 tons moved to Dec. 1 in the 1960 season.

The joint annual conference of the Lake Carriers' Association and the Dominion Marine Association, Toronto, Ont., will be held Jan. 15-17 at the Dearborn Inn, Dearborn, Mich.

Tin Plate . . .

Tin Plate Prices, Page 142

Demand for tin plate is reported perking up following the lull of recent weeks. In the Midwest, Inland Steel is again operating all of its electrolytic lines. During the recent slow period, it had closed down one line for a week and another line for two weeks.

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Dec. 18

IN

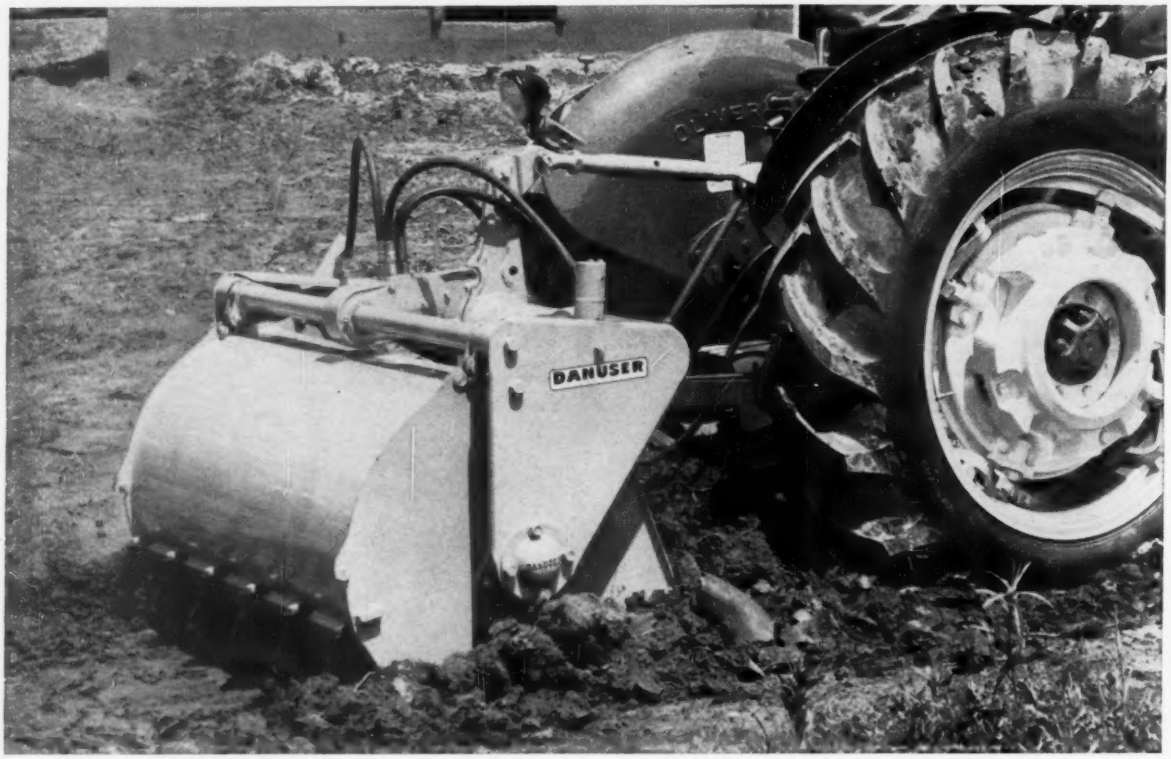
STEEL

Designers Use Color For Stress Analysis

STEEL's article capitalizes on full color to show how a thin film of photoelastic plastic can aid product designers. In one case, the technique helped halve the time needed to develop and design a new aluminum engine block. Engineers could watch and "measure" stress performance of the block as it was tested under normal operating conditions. The process can be used on castings, forgings, machined parts, stampings, assemblies or nearly any other workpiece.

Now **you can get USS "T-1" Steel from Steel Service Centers coast to coast**

Terra Scoop, designed for maximum strength with minimum dead weight. Built by Danuser Machine Company, Fulton, Mo. Weighs only 540 pounds.



Lightweight scoop built strong and rigid with USS "T-1" Steel

The big problem in designing the "Terra Scoop," a bucket with over ½-yard capacity for small tractors, was to obtain great strength and rigidity without exceeding size and weight limitations.

The first prototype scoop bulged at the ends and couldn't be used. That's where USS "T-1" Steel entered the picture. With a minimum yield strength of 100,000 psi, ¼-inch plates of "T-1" Steel gave the Terra Scoop all the strength it needed—and more, too—without increasing weight.

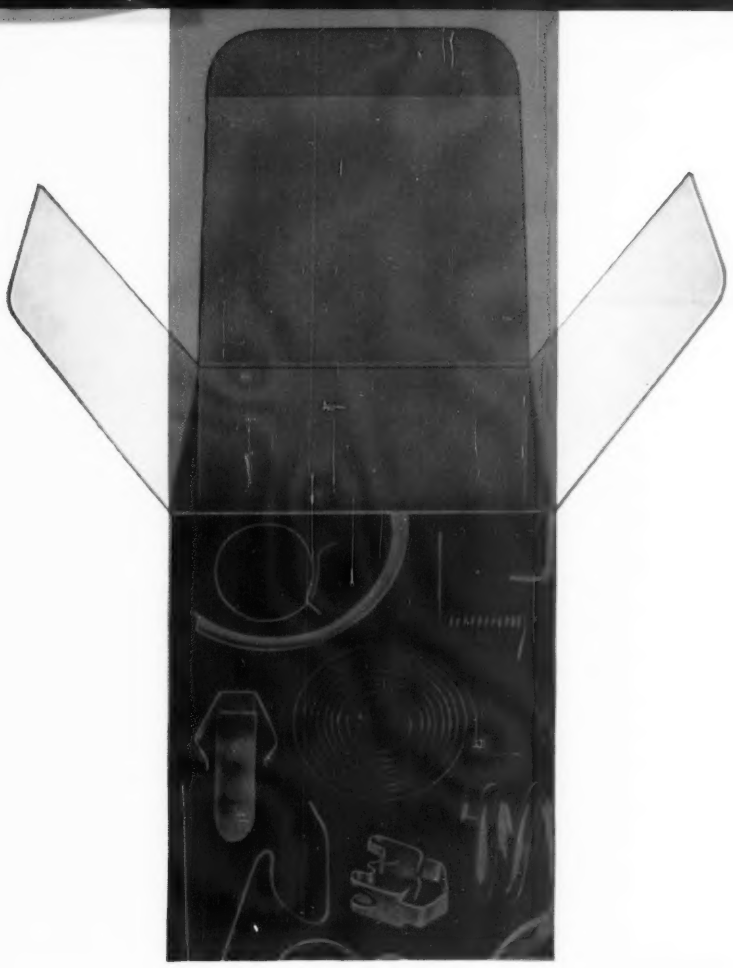
Since then, many Terra Scoops have been sold. *Not a single failure has been recorded in any of the end plates*—thanks to the extra yield strength of USS "T-1" Steel. What's more, the high resistance of "T-1" Steel to impact abrasion and corrosion has added years to scoop life.

Fabrication advantages. During initial testing, it was established that flame cutting, by which the end plate is made, actually imparts a superior hardness to the edge which functions as a cam in the operating mechanism. This edge has to retain its hardness to prevent peening from hardened rollers with which it comes in contact. Welding and machining were accomplished without difficulty using recommended shop methods.

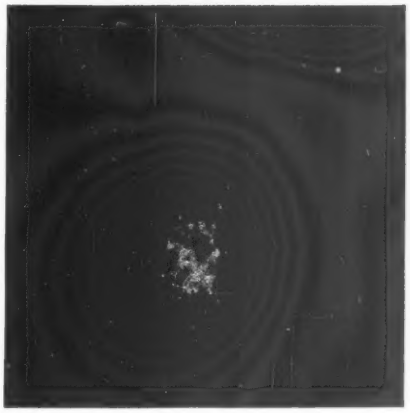
USS "T-1" Steel and the new lower priced "T-1" type A Steel can be furnished to a minimum yield strength of 100,000 psi, or a minimum hardness of 321 Brinell, depending on application. USS "T-1" Steel can also be furnished to 360 Brinell. All of these tough, weldable steels can reduce weight and increase the strength and life of your equipment. Call your local Steel Service Center for more information. Or, for the name of the distributor of USS "T-1" Steels nearest you, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. USS and "T-1" are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division • National Tube Division • Tennessee Coal and Iron Division • United States Steel Export Company

USS United States Steel



If the parts you make can fit in this box, Torrington can fit into your plans. We'll send you this mailing box for your parts and cost them without obligation. For wire forms, strip forms and springs, there's a Torrington machine to make them better, faster and for less.



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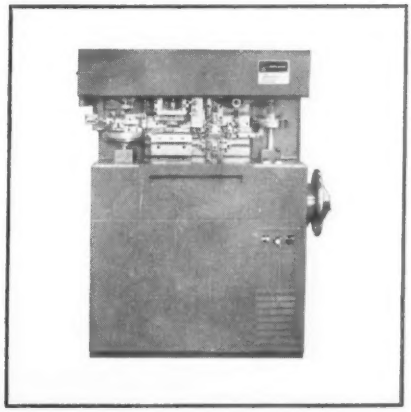
MANUFACTURING COMPANY
MACHINE DIVISION, TORRINGTON, CONNECTICUT



maximum tube life per dollar—When you buy Timken® seamless steel pressure tubing, you receive fine forged quality that is uniform from heat to heat, tube to tube, order to order. We target it to your end use. And our metallurgists draw from a background of over 40 years' experience to help you select the one tube that will give you maximum tube life per dollar.

Timken seamless steel tubing is available in carbon, alloy and stainless grades, up to 11″ O.D. and 3¼″ wall. And there's a Timken seamless steel pressure tube to meet practically any combination of temperature, pressure or corrosion. For help that assures your selection of the one tube that will be most economical and perform best for you, call in Timken Company metallurgists. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

TIMKEN®
FINE ALLOY STEEL

TIMKEN ALLOY STEEL AND SEAMLESS STEEL TUBING ARE AVAILABLE FROM STEEL SERVICE CENTERS IN MORE THAN 40 CITIES IN THE UNITED STATES